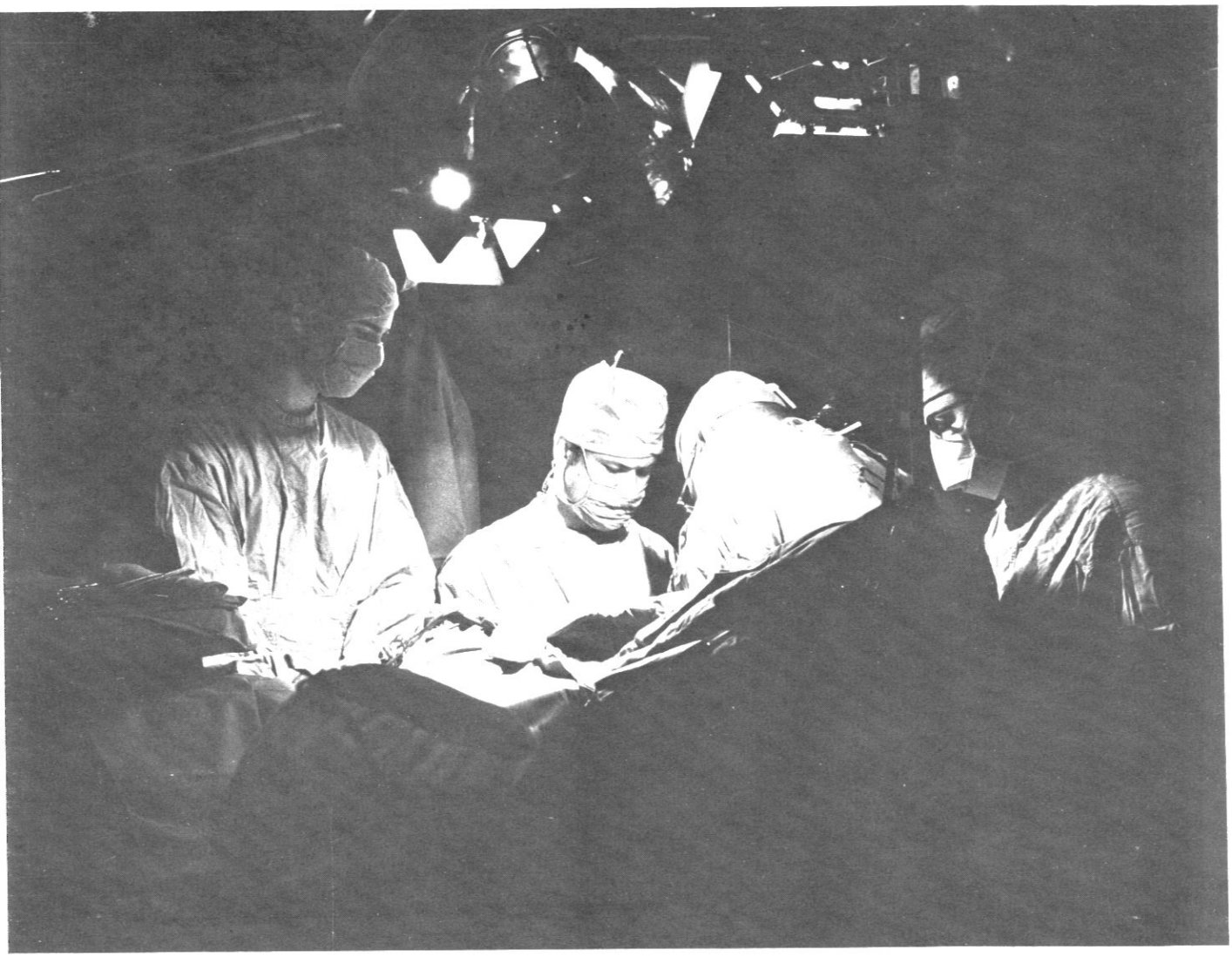
U. S. NAVY Medicine



October 1970

United States Navy Medicine

Vol. 56 October 1970 No. 4

POLICY

U.S. Navy Medicine is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry and allied sciences. The items used are neither intended to be, nor are they, susceptible to use by any officer as a substitute for any item or article, in its original form. The opinions and conclusions expressed in the articles or items included herein are those of the respective authors and do not necessarily represent the views of the Department of the Navy, the Bureau of Medicine and Surgery or any other governmental department or agency thereof.

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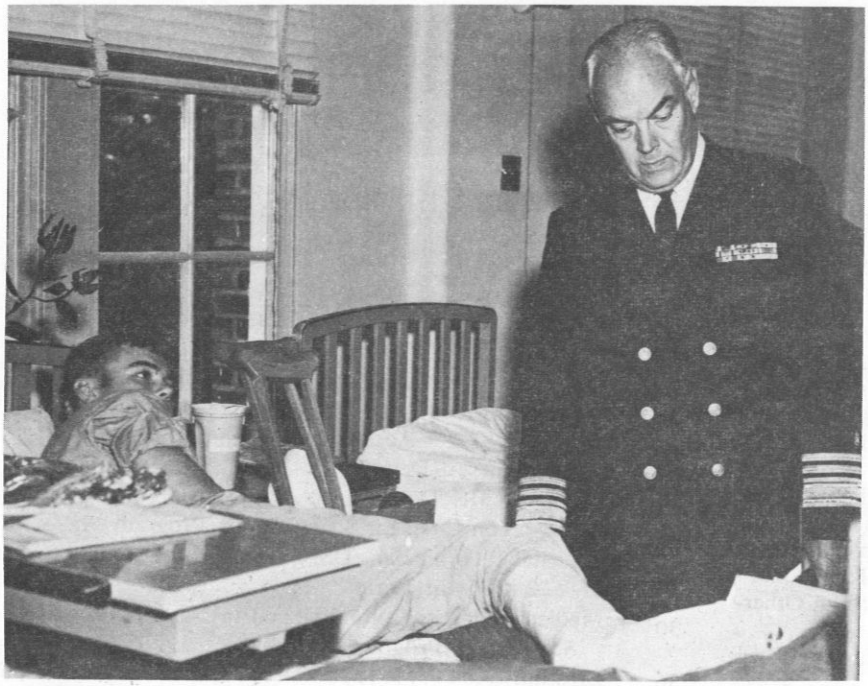
The issuance of this publication approved in accordance with NAVEXOS P-35.

NAVMED P-5088

CONTENTS

Credits: All pictures are Official U.S. Navy Photographs unless otherwise indicated.

The cover photograph was taken in an Operating Room of the Naval Hospital at Camp Pendleton during a cranioplasty utilizing a pneumatic craniotome and methyl methacrylate. From left to right: HM2 Gluck, Neurosurgery O. R. Technician; Neurosurgeon CAPT Frederick Jackson, MC, USN; Surgical Assistant LCDR James Back, MC, USNR; and CAPT Henry J. Sazima, DC, USN (author of article on page 36). A 16 mm sound color movie was made of the operation by the camera and photographic team from the Univ of California School of Medicine at San Diego. The movie is available from the American College of Surgeons Film Library.



from the Chief

We can take pride in the knowledge that the quality of medical care provided by military hospitals is generally considered good, even superior to the average level of available care in civilian health systems. But this fact cannot suffice to reassure the concerned patient whose health and physical well being are open to question. At best, patients seek confidence and understanding while under physical or emotional duress, at a time when discomfort, uncertainty and depersonalization can be largely dispelled by thoughtful communication.

Secreted by the topmost layer, effective communication drains freely throughout the inner layers to vitalize the very core of the organ. Consistent coordinated counsel that is honest, hopeful and readily understood can do much to allay the usual anxieties of patients and their families. Utilizing this vital concept, some of our hospitals have developed Patient Care Coordination Teams which make regular, individual contact with patients, rendering valuable assistance that cannot be consistently provided by the nursing and medical staff alone.

There is a parallel need to facilitate leadership and communication within the medical activity itself. Effective Navy Sponsor Programs generate an enthusiastic response in newly received members who might otherwise be left with the impression that the activity to which they have been permanently assigned pays only lip service to valued amenities. Equally important is the intentional exposure of newly received members, to staff personnel whose mature regard for people and kindly clinical approach are worthy of emulation. Often the less experienced staff members are grateful for assistance in learning to discern and manage challenging patterns of patient behavior—the hostile aggressive who is thoroughly frightened, the gentle patient who is so anxious to please that he claims to understand when in fact he fails to comprehend, the guilt-ridden, the facade of bravado in a patient close to panic, or the patient whose intense fear may forestall clarification of his clinical status through tactful discussion. Ample provision should also be made for mature, scheduled discussion and constructive debate concerning professional and administrative differences which can arise among staff members. Such opportunity for appropriate consideration of management problems can do much to obviate the misfortune of implied criticism or impulsive conversation in the presence of patients—an intolerable breach of responsibility which, in a cruel sense, deprives patients of confidence in the institution and attending staff.

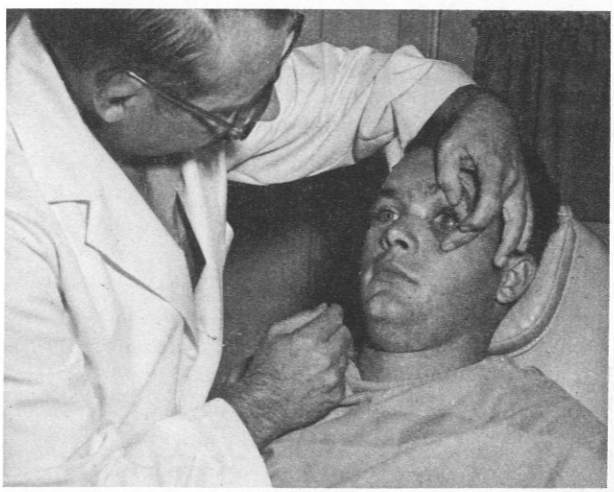
We would do well to heed what patients have taught us for countless years. In an impersonal atmosphere of cold indifference, the simplest procedure can assume the proportions of a monstrous assault. In an attitude of understanding and encouragement, the most formidable situation can be sufficiently molded to allow for patient acceptance.

MAXILLOFACIAL PROSTHETICS—A VERSATILE HOSPITAL SERVICE

By Mrs. E. W. Graeff, BA, Publications Department, and*
CAPT S. O. Bartlett, DC, USN,† Diplomate of American Board of Prosthodontics,
Naval Dental School, NNMC, Bethesda, Md.

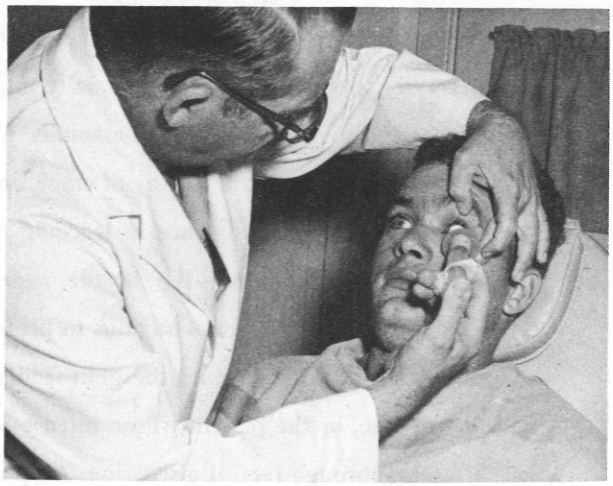
In 1944, the need for artificial eyes for Navy and Marine Corps casualties of World War II was acute, and the special glass required for glass eyes was not available from Germany. Officers at the Naval Dental School, Bethesda, undertook to develop a suitable plastic ocular prosthesis. Elsewhere, dentists had actively participated in attempts to fabricate eyes from acrylic resin. This was logical because they were familiar with the regional anatomy and with the techniques of working with plastic materials.[1] The plastic eye proved to be superior in every way to the glass eye, and the highly successful fabrication technique developed at the Dental School has changed very little over the years.

From this pioneer beginning the creation of maxillofacial prosthetics in the Navy—as in the dental profession generally—has grown into an important and useful specialty. A surprising variety of prostheses and other devices are designed and fabricated, not only on consultation with specialists in surgery of the head and face but also with general and orthopedic surgeons, gynecologists, radiologists, speech and occupational therapists, medical research teams, and instructors in clincial techniques.



Capt S. O. Bartlett, DC, USN, examines eye socket. Note that spherical (round-ball) implant had been used.

* Technical Publications Writer-Editor (Medical Science).
† Head, Prosthodontics Department, Instructor in Graduate Education Programs, and Maxillofacial Prosthetics Specialist.



Maxillofacial prosthetist injects impression material (alginate) into socket.

Scope and Objectives

A recent article in the *Journal of Prosthetic Dentistry*[2] described maxillofacial prosthetics as follows:

The science of maxillofacial prosthetics covers a wide range of treatment of lesions and of defects of the head and the face. It includes the prosthetic replacement of eyes, ears, noses, maxillae, mandibles, esophagi, cranial bones and the fabrication of obturators or stents and the like. Organs may be lost through surgery or may be congenitally missing. Mouth-controlled appliances for amputees and for paralyzed individuals provide a means for grasping objects, turning pages, typing, and doing things that make life for the less fortunate just a bit more complete. When hands, fingers, breasts, and the like are required we enter the field of somatoprosthetics.

Rehabilitation of the individual to a normal position in society is the primary objective of the specialty. In order to achieve this goal, restoration of anatomical form and physiological function must be accomplished while preserving the health of the remaining tissues.

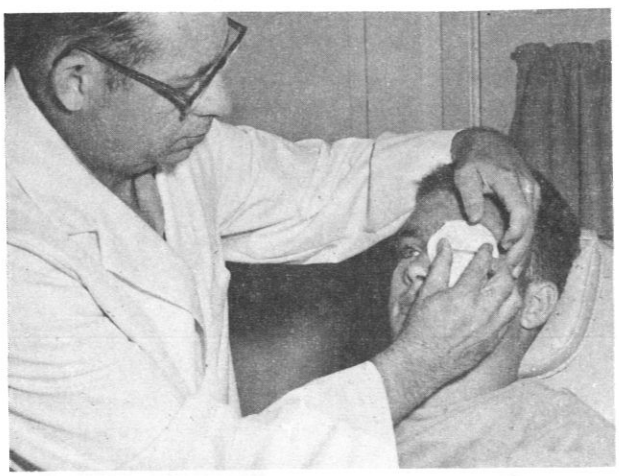
Reconstructive surgery, at a cursory glance, may seem to be the most desirable method of treating

defects. A more thorough examination of the situation frequently reveals that prosthetic restoration is the treatment of choice. In fact, in the case of a lost eye it is the only means currently available. Whenever the defect is the result of oncologic treatment, prosthetic restoration has the advantage of allowing easy, frequent inspection of the tumor site. The severely burned patient often benefits most from a combination of prosthetic and surgical repair because of the scarcity of normal tissues for use in forming pedicles and grafts. The heavily irradiated patient presents a poor blood supply that impairs healing after surgery and reduces the tolerance of the tissues to a prosthetic appliance. Such patients deserve individual evaluation of their merits. Senescence or systemic disease may contraindicate surgery. The initial expenditure of time and effort is usually less with prosthetic reconstruction, and this may be the deciding factor for some patients. It must be recognized that the traumatically injured or congenitally deformed young person should receive surgical reconstruction if possible. The fortunate patient is the one who is treated by a team of surgeons and prosthetists who augment each other's efforts to the benefit of the patient.

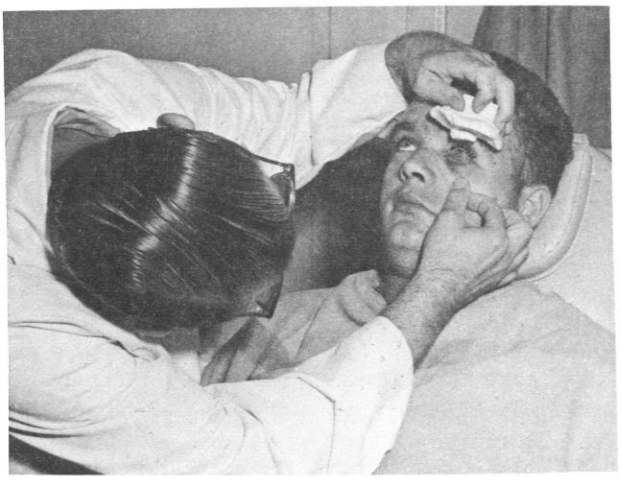
Knowledge and Skills

A question often asked is, "What connection is there between dentistry and maxillofacial prosthetics?" The answer is, "Fundamental knowledge and skills."

In the Navy, the maxillofacial prosthetist is a dental officer who has had two years of postdoctoral training in prosthodontics. Thus, he is thoroughly



Maxillofacial prosthetist holds acrylic resin "tray" superimposed over alginate material in socket.

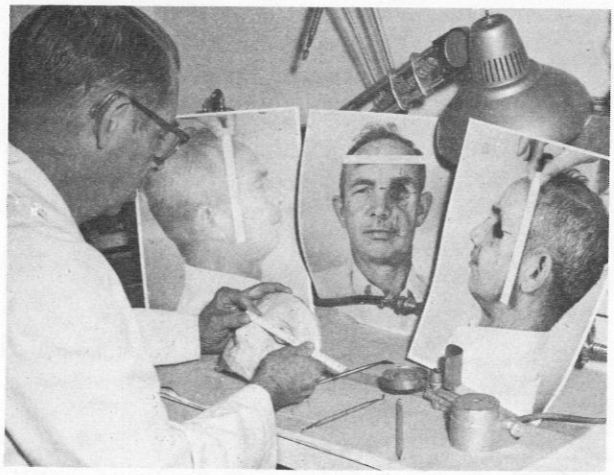


Maxillofacial prosthetist removes impression from socket.

grounded in regional anatomy, physiology, and pathology, and has had considerable experience in handling patients who require prostheses. He receives a final year of specialized training in the Maxillofacial Prosthetics Division, Naval Dental School (NDS), under the supervision of a diplomate of the American Board of Prosthodontics. Currently, the instructor is CAPT Stephen O. Bartlett, DC, USN, Head, Prosthodontics Department. NDS is one of five institutions in the country fully approved for maxillofacial prosthetic residencies by the Council on Dental Education of the American Dental Association.

The residency training includes treatment of patients from the Naval Hospital, NNMC, Bethesda, Md., and completion of a sufficient number of prosthetic restorations, including associated laboratory work, to ensure a high degree of proficiency in all phases of maxillofacial prosthetics. Report writing, participation in seminars, reading, and research are also a part of the training. The trainee attends the Cleft Palate Conference chaired by the Plastic Surgery Service of the hospital and the Oncology Clinic chaired by the otolaryngologists. In addition, the resident attends, whenever possible, short courses at the Lancaster Cleft Palate Clinic, Lancaster, Pennsylvania; an observership in the Maxillofacial Prosthetic Clinic of the Zoller Memorial Dental Clinic, Chicago; or an observership in the Dental and Head and Neck Services of the Memorial Center for the Treatment of Cancer and Allied Diseases, New York.

This year, NDS included a course on maxillofacial prosthetics in its series of one-week continuing education courses for dental officers in the Federal services. The course, which was open to a limited number of prosthodontists, was the first to be sponsored by a



Maxillofacial prosthetist takes measurements in laboratory phase of procedures for replacing eye and associated lid structures.

Government facility. CAPT Bartlett, the course director, assisted by CDR D. J. Moore, DC, USN, Head, Maxillofacial Prosthetics Division, assembled clinical specialists in the fields of plastic surgery, irradiation therapy, ophthalmology, otolaryngology, and oral surgery, who presented lectures oriented to their respective specialties. To demonstrate successful case management, including the exacting coloring techniques, ocular and nasal prostheses were fabricated for patients. One day was devoted to the basic chemistry of materials and their laboratory and clinical use. This presentation was culminated by a series of table clinics illustrating the materials and techniques discussed. The high point of the course was a presentation by Dr. I. K. Adisman, of the New York University College of Dentistry, an eminent authority in maxillofacial prosthetics, who discussed the present state of the specialty and attempted to predict its future course.

The Naval Dental School also trains dental technicians who wish to specialize in maxillofacial prosthetics. Usually, one technician at a time takes the six-month course, and with individual instruction and close supervision he becomes highly skilled. A prerequisite is completion of the Class A course in prosthetic laboratory techniques.

Thus, with both dental officer and technician, the knowledge and skills required for proficiency in maxillofacial prosthetics stem from a background in prosthodontics. Most of the materials used in fabrication of maxillofacial prostheses are the same as, or similar to, those used in making dentures; and although the clinical and laboratory procedures vary in detail, they follow a similar sequence. The procedures may be outlined very briefly as follows.

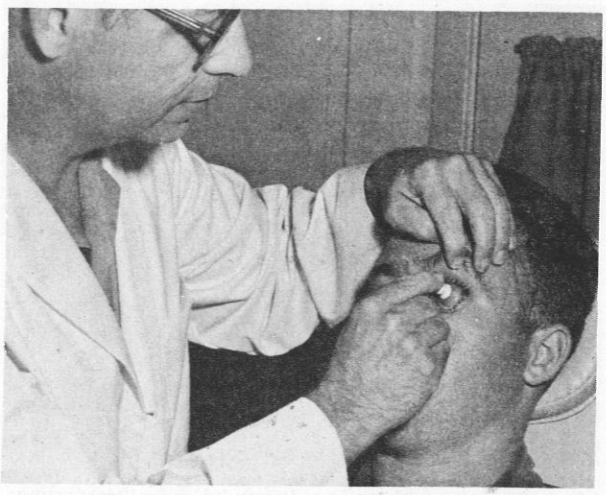
Basic Procedure

An impression (negative likeness) of the defective area on the patient is made with a material such as alginate, hydrocolloid, or impression compound. A model or cast (positive likeness) of the area is fabricated by pouring a mix of dental stone into the impression. One or more of these casts are used in forming, fitting, and processing the prosthesis. A three-dimensional pattern of the part that needs to be replaced—an ear or a section of the palate for example—is formed of wax or clay. The pattern is fitted to the cast and tried on the person. When the pattern is shaped satisfactorily to the smallest detail, it is placed on the cast and both cast and pattern are put in a flask (a sectional metal case used in processing plastic materials and metal). Dental stone is then packed around the pattern to make a mold in which the prosthesis is formed and processed.

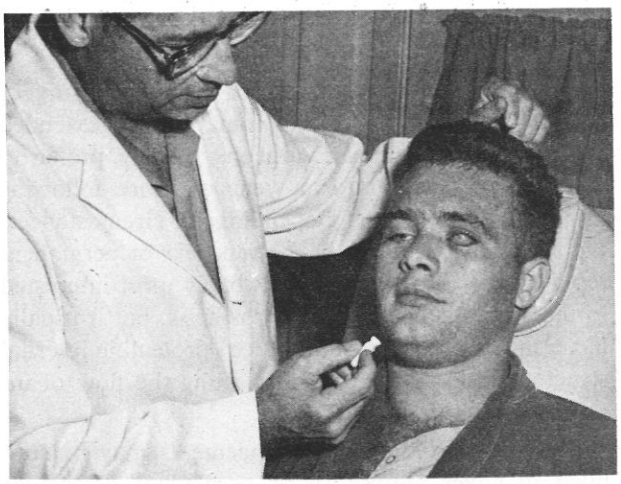
Of course, no procedure is as simple as the foregoing outline suggests; and when a metal mold must be used, many additional steps are required. Every extraoral prosthesis must be so perfect in form, texture, and color that it is almost indistinguishable from the natural structures; and every study model, intraoral prosthesis, implant, or device of any sort must be as dimensionally accurate and as durable as it can be made.

Maxillofacial Prosthetics and the Hospital

Maxillofacial prosthetics is practiced primarily within the hospital setting. Both military and civilian hospitals now use the multidisciplinary approach to treat patients with anatomical defects of the head and face, and increasingly the specialist in maxillofacial prosthetics is a consultant and active participant.



Maxillofacial prosthetist inserts wax pattern in socket.



Maxillofacial prosthetist checks contour of wax pattern and size of palpebral opening.

Adisman[3] states that the "medical and surgical needs for dental prosthetic service in a hospital center are focused in the maxillofacial area, such as (1) tumor board participation, (2) clinical pathologic conferences, (3) head and neck conferences, (4) reconstructive plastic surgery conferences, (5) the cleft palate team, and (6) temporomandibular joint conferences." Patients at naval hospitals include military personnel wounded in combat, victims of automobile or other accidents, individuals with cancer, and children with developmental defects.

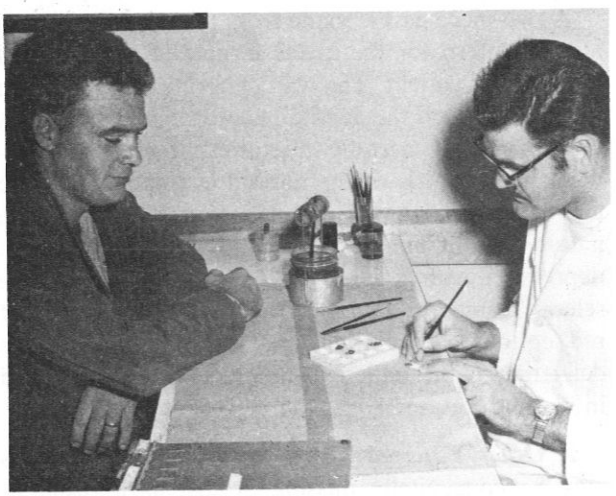
The physician, who may be a plastic surgeon, an ophthalmologist, a neurosurgeon, an otolaryngologist, an oral surgeon, or other specialist has primary responsibility for treatment, of course, but often the maxillofacial specialist can suggest modifications of surgical procedures that will provide a foundation for prosthetic rehabilitation. He can also advise the surgeon on dental problems that are often associated with maxillofacial defects and suggest the manner whereby dental and maxillofacial treatment may be combined. Other specialists who may collaborate in treatment of maxillofacial patients include the radiologist, the speech therapist, the pathologist, the orthodontist, and the psychiatrist. Not all the specialists mentioned are required for every patient, but all who are involved in any given case should work together as a team, with their major objective being the welfare of the patient.

With patients who are to undergo surgery that will produce a deformity, one of the maxillofacial prosthetist's most important duties is to make an impression, *before the operation,* of the body parts that are to be excised. This helps immeasurably in the fabrication of an esthetic prosthesis or in the surgical reconstruction of the defect. Also, with the aid of a cast made from a preoperative impression, the prosthetist can frequently provide an appliance for immediate insertion. Such an appliance often minimizes the deformity by maintaining the remaining structures in their normal position, and more significantly it may also preserve function.

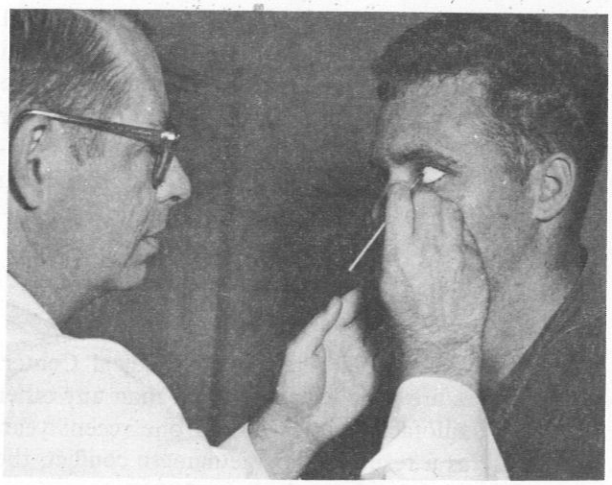
Types of Prostheses

1. *Eyes.* At the National Naval Medical Center, artificial eyes are supplied more often than any other type of maxillofacial prosthesis. In one recent year, principally as a result of the Vietnamese conflict, the Naval Dental School fitted about 300 new patients with ocular prostheses. All of these were custom-made, being fabricated from an impression of the individual's empty socket. It is possible to utilize commercially made stock eyes, but they will never have the precision of fit, color, movement, *or the comfort,* that is possible with custom-made prostheses.

The surgeon takes the first step in fitting of the artificial eye by inserting an implant in the tissues of the socket. The implant's purpose is to replace part of the bulk of the missing orb and to provide movement to the prosthesis. The ophthalmologists and maxillofacial prosthetists at Bethesda recently developed an implant molded of silicone rubber, which is spherical on its inner surface and ring-shaped on its outer surface. It is pierced with slots through which the rectus muscles are drawn before being imbricated and sutured. Most frequently, however, the implant is made of methyl methacrylate and may be spherical or



DT2 B. Morris, USN, paints paper disk for iris as patient watches.



Maxillofacial prosthetist places dot of ink to locate center of iris. White acrylic resin has been processed in mold made from wax pattern.

have protrusions that mechanically produce irregularities in the socket (this is the so-called Iowa type of implant[4]). An artificial eye that conforms to these irregularities may provide increased mobility.

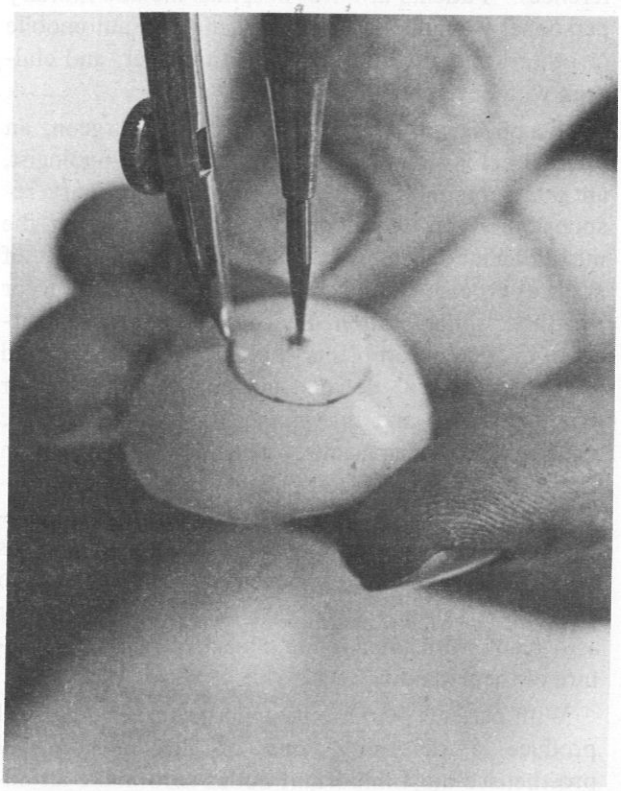
The custom eye is fabricated by making an impression of the socket. The inner surface of the prosthesis contacts the mucous membrane over the buried implant that is attached to the muscles and moves in coordination with the remaining natural eye. It can be seen that the impression of the socket is essential if the "Iowa" implant has been used. In making the impression, the maxillofacial prosthetist must observe the condition of the orbit, the eyelids, and the periorbital structures. A portion of these structures may have to be replaced, in addition to the eye itself, in some patients.

A two-piece cast is made from the impression, and a wax pattern for the eye is formed in the cast and fitted to the patient. The wax pattern is used to make a mold in which the acrylic resin eye is processed. A circular recess, carefully measured for size and alignment with the iris of the natural eye, is cut into the acrylic resin. A paper disk is painted to match the natural iris in minute detail and is sealed into the depression with a coat of clear acrylic resin. The sclera is tinted and supplied with "blood vessels" of red cotton fibers. After final polishing, the eye is delivered to the patient, who is carefully instructed in its insertion, removal, and cleansing.

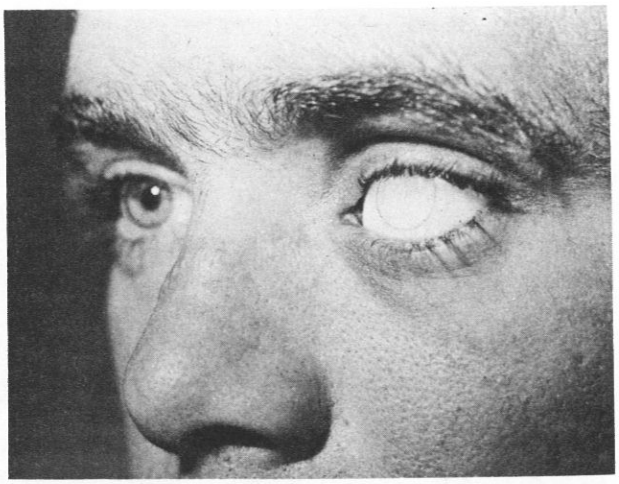
2. *Other External Prostheses.* One or both ears may be congenitally missing or lost as a result of accident or burns. An ear may be fabricated as a mirror image of the opposite remaining ear or molded from an impression made on a donor whose ears are of an appropriate size and shape.

The principal cause of loss of the nose is surgery for removal of basal cell carcinoma that has extended into cartilage or bone. Surgeons usually prefer to delay reconstruction for a year or more following excision of the tumor. Depending on circumstances, the prosthetic nose can be a temporary or permanent replacement. The patient is probably most interested in the aesthetic effect of the prosthesis, but it usually has a functional effect in addition, protecting internal structures and surfaces and directing the flow of inspired air.

Cosmetic maxillofacial replacements may be supplied to cover temporary or permanent defects or grossly disfiguring scars. These replacements are now usually fabricated of silicone rubber. They are held in place with a surgical grade rubber adhesive. Each prosthesis is shaped for optimum appearance. Color is matched by adding pigment to the mix until the individual's base shade is reached. This is the lightest shade of the complexion in the area where the prosthesis is to be attached. Additional surface tinting with traces of color and texturizing by such means as applying a catalyst to the surface of the prosthesis with a patch of gauze, are used to produce the most



Circle indicating size and location of iris is drawn on scleral blank.



Scleral blank has been placed in socket for evaluation of circle's size and location.

lifelike prosthesis possible. The prosthetist and technician realize that a lifelike prosthesis can mean self-acceptance, social acceptance, and employability to the patient. Fortunately by applying skill and devotion, the maxillofacial team is able to help most patients accommodate quite successfully to their handicap.

Prostheses eventually deteriorate and require periodic replacement. The Dental School has a simple but effective method of record keeping that allows the fabrication of additional prostheses with a minimum of effort. All that is required is to retain the stone mold, to record the colors used,[5] and to keep a finished prosthesis of the patient. There is no essential need for the patient to return for fitting.

3. *Intraoral Prostheses.* The maxillofacial prosthetist is, of course, especially knowledgeable in the area of intraoral prostheses. These are required in treatment of patients with developmental deformities, war wounds, accidental injuries, and cancer surgery.

Of recent interest is the process termed "maxillary orthopedics," in which bony segments of the maxillary arch of cleft palate patients are repositioned with prosthetic devices. Treatment is initiated by making an impression and cast of the maxillary arch when the child is only a few weeks old. At NDS, the following procedure is used: The prosthetist cuts the cast and positions the pieces correctly so that he can design and fabricate an appliance, or series of appliances, that will put pressure on the segments of the arch to move them into the correct position and then maintain them there. The silicone rubber appliance has the immediate effect of separating the mouth and nose. The infant eats better, and the sounds he makes are more nearly normal.

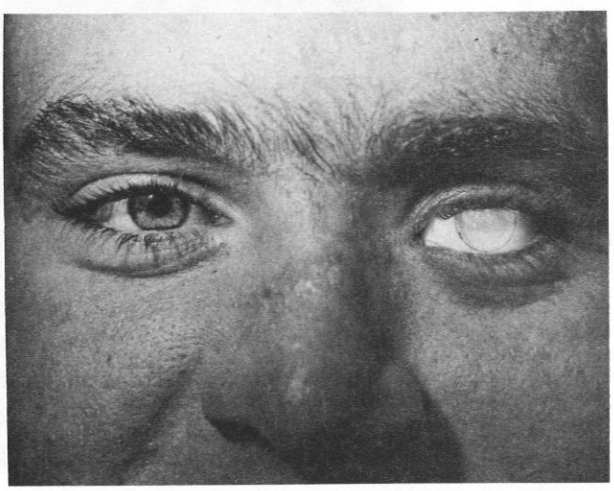
The obturator for the cancer patient who undergoes maxillary resection is relatively common. A prosthesis that is fabricated preoperatively for immediate insertion will aid the patient's morale by helping to maintain normal speech and eating patterns and to preserve facial symmetry. In addition, the temporary prosthesis will act as a stent for the skin grafts that are used in radical maxillary surgery. Its use will also facilitate construction of the permanent prosthesis.[6]

Surgery or trauma to the mandible and the tongue will severely affect speech, mastication, and deglutition, principally through loss of the necessary contact between the tongue and the palate. A prosthesis that helps provide this contact can materially improve the patient's conditon.[7]

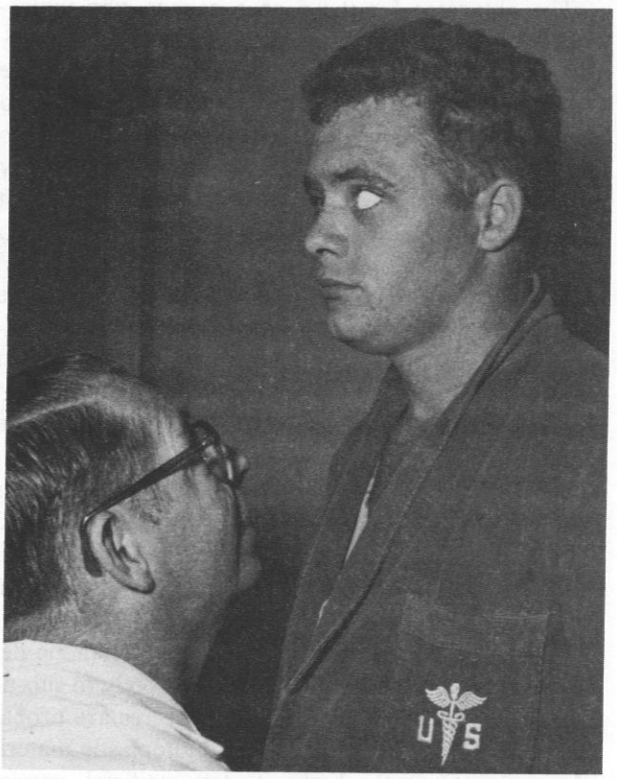
Any of the various types of intraoral prostheses may be fabricated in combination with dentures; and if natural teeth are available, the appliance will usually be stabilized through attachment to the teeth by clasps.

4. *Internal Prostheses.* Implants are prosthetic devices that are surgically inserted in the body to substitute for normal tissues or organs. Sutures are probably the oldest and most often used alloplastic materials implanted in the body. Today, artificial arteries are common, and tremendous effort is being made to develop an artificial heart. Through the years, virtually every conceivable material has been tried for implantation. Stainless steel, tantalum, and chromium-cobalt are frequently and successfully used metals; acrylic resin, polyethylene, nylon, polypropylene, and silicone rubber are commonly used plastics.

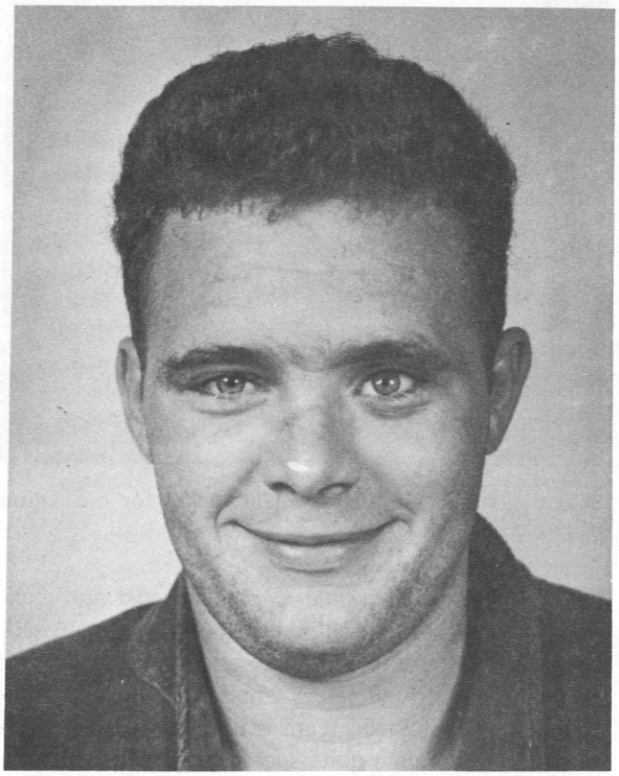
The maxillofacial prosthetist will probably concentrate on methyl methacrylate, tantalum, and silicone rubber. Methyl methacrylate is easily handled in the



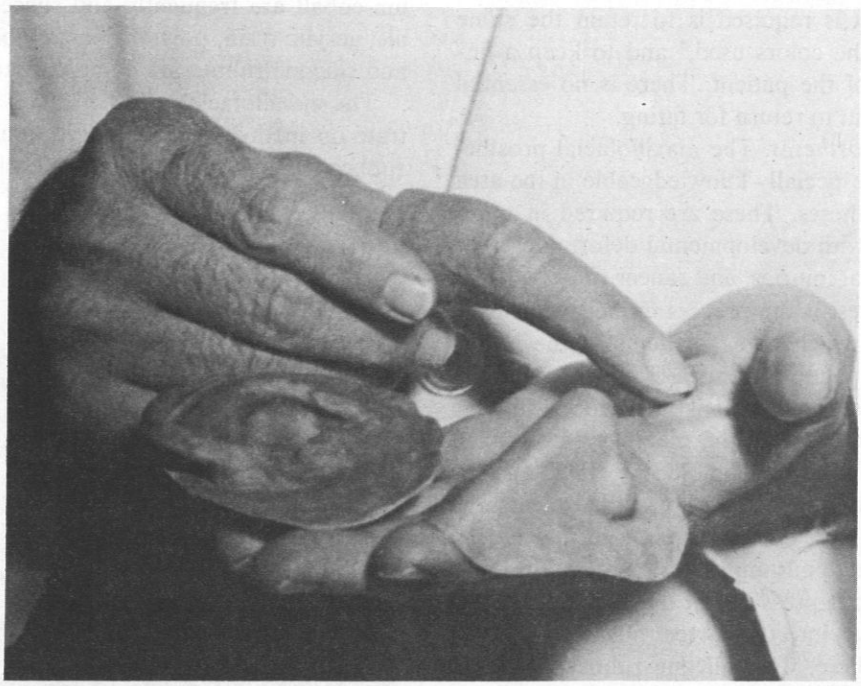
With scleral blank in socket, a recess is cut for painted iris.



Maxillofacial prosthetist checks recess for orientation of base of recess with plane of iris in natural eye.



Patient wearing finished prosthesis.



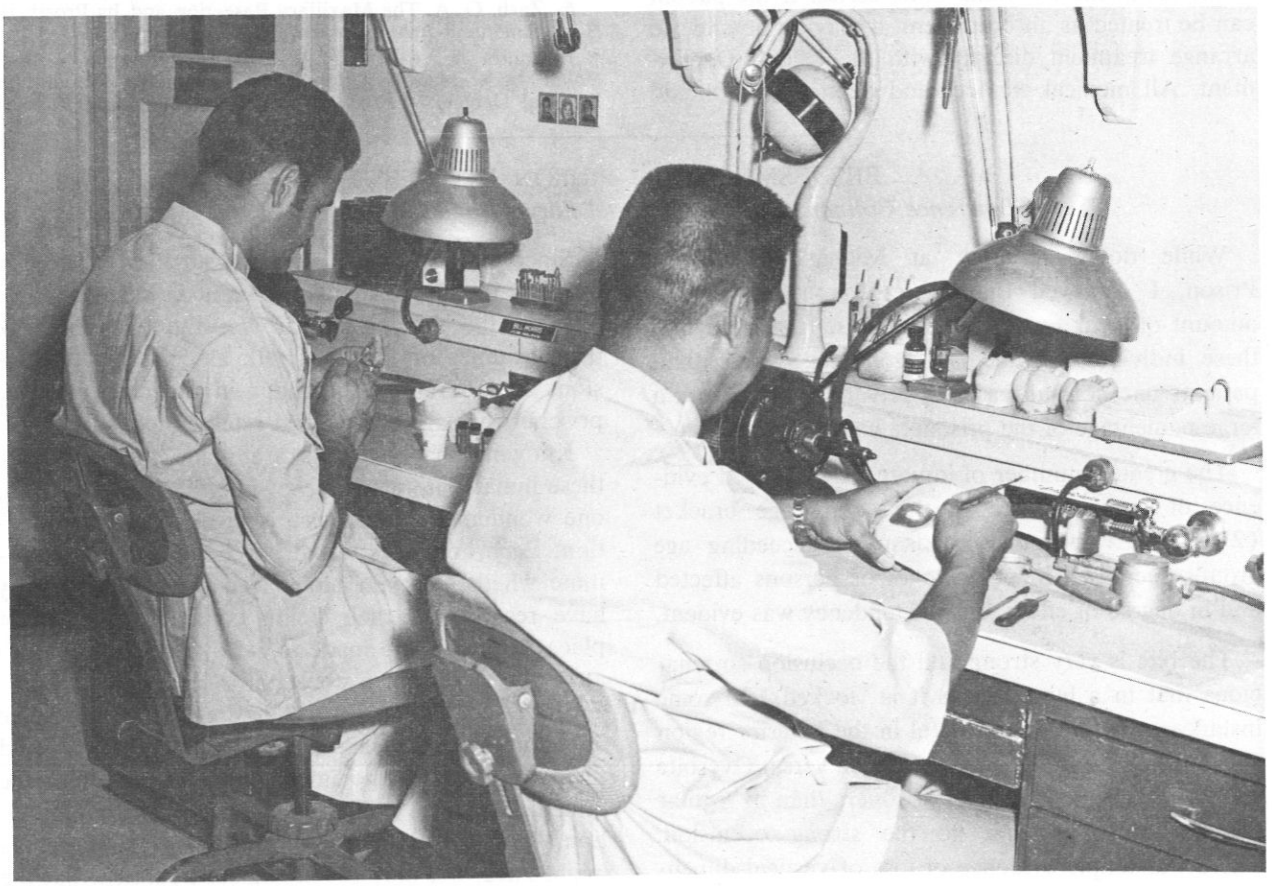
Prosthetic ear, finger, and nose. Finger is a cosmetic replacement; it is not functional.

laboratory and has been used for cranial implants for over 30 years. Tantalum has a similar record of use and can be manipulated in the laboratory. Silicone rubber of medical grade is one of the newer materials. So far, it has the best record of any material with respect to lack of inflammatory reaction by the tissues. The maxillofacial prosthetist uses these materials to fabricate cranial plates to replace lost sections of the skull, chin implants to augment the chin, malar implants to restore contour to the cheek, and other devices to restore portions of the head and face.

5. *Surgical Aids and Training Devices.* Various appliances can aid the surgeon in reconstructive efforts. Splints are made that stabilize the teeth and immobilize bones while they are healing. Stents are fabricated to shape soft tissues during healing and to maintain skin grafts in position. A neck support splint has been found to be helpful to the plastic surgeon who is repairing burns to the anterior neck. Unless some device is applied, the healing process tends to shrink the tissues and pull the mandible down into close proximity to the sternum. The splint is made of methyl methacrylate and has a soft liner of silicone foam rubber. This appliance can be fabricated in a matter of hours, so there is no opportunity for shrinkage of tissues to occur. These and other surgical aids are usually fabricated rather easily but can be of great benefit to the patient.

The maxillofacial prosthetist can provide the surgeon with models of any part of the body. They can be invaluable in planning reconstruction or realignment of hard and soft tissues and in explaining the proposed procedures to patients, relatives, auxiliary personnel, and students. They can also be used for development of braces and other treatment devices.

Training aids may include moulages of wounds, manikins, and other models that simulate portions of the body. For example, the Maxillofacial Prosthetics Division of the Dental School was recently asked to fabricate four model legs—one with normal "veins" and others with venous complications such as a clot or defective valves. The legs were to be used to train personnel in the operation of a sonar type of machine that measures the rate of blood flow by bouncing sound waves off the red blood cells. The bones of these legs were of wood, the flesh of sponge rubber,



Left, DT2 B. L. Morris, USN, tints a nasal prosthesis; right, DTC L. Y. Pineda, USN, forms a wax pattern for an oculofacial prosthesis.

and the skin of silicone rubber. Air bubbles simulated red blood cells in the "blood" that flowed through the rubber tubing veins. Other unorthodox assignments have included the fabrication of contact lenses for monkeys being used as subjects in a research project, and special anesthetic masks for cats.

At one time, lead-backed acrylic resin shields were often fabricated to protect the normal tissues of the cancer patient who was to undergo irradiation. Such shields are not used with today's megavoltage machines because scatter radiation from the lead backing is hazardous. However, plastic containers for radium needles and other small sources of radioactivity are still requested by radiologists.

Availability of Services at Naval Hospitals

Maxillofacial prosthetic services are available at the following naval hospitals: Bethesda, Great Lakes, Oakland, and San Diego. Transfer of patients from one hospital to another on an inpatient basis should be arranged in accordance with instructions in the *Manual of the Medical Department* and pertinent directives in the BUMED 6320 series. If the patient can be treated as an outpatient, it may be possible to arrange treatment directly with the Dental Department. All medical services and departments should be cognizant of the maxillofacial prosthetic services that the Navy provides and utilize them fully both for consultation and for treatment.

ACKNOWLEDGMENT

The authors wish to express their appreciation to Mrs. M. L. Gates, Editorial Assistant, for compiling and organizing information utilized in preparing this paper.

REFERENCES

1. Bureau of Medicine and Surgery, United States Navy: Acrylic Eye and Oculofacial Prostheses developed by the U.S. Dental School, National Naval Medical Center, Bethesda, Maryland, presented at Third Pan American Congress of Ophthalmology, School of Medicine, University of Havana, Havana, Cuba; 1948. Pamphlet.

2. Fonder, A. C. Maxillofacial Prosthetics: *J Prosth Dent* 21:310–314, Mar 1969.

3. Adisman, I. K. The Role of Prosthodontists in Hospitals: *J Prosth Dent* 20:269–275, Sept 1968.

4. Spivey, B. E.; Allen, L.; and Burns, C. A. The Iowa Enucleation Implant. A Ten-Year Evaluation of Technique and Results: *Amer J Ophthal* 67:171–188, Feb 1969.

5. Firtell, D. N., and Bartlett, S. O. Maxillofacial Prostheses: Reproducible Fabrication: *J Prosth Dent* 22:247–252, Aug 1969.

6. Zarb, G. A. The Maxillary Resection and Its Prosthetic Replacement: *J Prosth Dent* 18:268–281, Sept 1967.

7. Cantor, R.; Curtis, T. A.; Shipp, T.; Beumer, J.; and Vogel, B. S. Maxillary Speech Prostheses for Mandibular Surgical Defects: *J Prosth Dent* 22:253–260, Aug 1969.

BRUXISM AMONG PRISON INMATES

Lawrence Cotman, BS, DDS, Dental Survey, p. 31, January 1970.

While doing research at Michigan's Jackson Prison, I observed that there was a tremendous amount of wear on teeth of inmates. It seemed that these individuals bruxed to a greater degree than patients one normally sees in private practice, and a large percentage of the prisoners had a "locked bite."

The greatest number of inmates who showed evidence of bruxism were in the young age bracket (21–30). Evidence of bruxism in succeeding age groups decreased in percentages of persons affected and in degree of effect, but the tendency was evident.

The bite is very strong and the occlusion so tenacious that in a few inmates it is "locked." In some instances, the bite was forceful in the anterior region and open in the molar region, or vice versa. Overbite was more prevalent in these prisoners than in regular patients—due, perhaps, to the strong occlusion. There was ample evidence of loss of vertical dimension in the prisoner group. As might be expected, this was most noticeable in the older groups.

Since there was such a marked attrition of teeth in nearly all the prisoners examined, one wonders whether the excessive wear was the forerunner of their troubles or the aftermath associated with tensions that developed. Perhaps in the case of these prisoners bruxing is a tension-release mechanism.

Knowing that attempts are made to rehabilitate these inmates in many ways while they are in prison, one wonders if dental care is given sufficient attention. Each inmate is tested psychologically to determine whether certain unresolved central needs may have resulted in their being confined in the first place. Attempts are made to resolve through psychiatric care any problems brought to light.

Since the authorities are interested in the entire individual, the evidence of damaging bruxism would seem to point up the importance of correcting the inmates' occlusal habits as part of their rehabilitation. To help release the tensions that the prisoners might have, not only psychological treatment but the use of occlusal equilibration or the bite splint—or both—ought to be employed.

SURGICAL RESEARCH AT NMRI

There are several distinct but related aspects of duty in the Experimental Surgery Division of the Naval Medical Research Institute which merit discussion. They are concerned with medical practice, teaching, and research, the three main foundations of good patient care.

The performance of research is the primary activity. The program has been oriented toward the treatment of combat trauma, based on a close relationship with the staff of the Surgical Research Unit at the former Station Hospital, DaNang, Vietnam. Specific projects have dealt with unsolved problems identified by the surgical investigators at DaNang. While that facility has closed, a large number of issues which were investigated and identified there remain for further development at NMRI.

The primary emphasis has been in the areas of hemorrhagic shock and systemic gram-negative sepsis, concentrating on ways of dealing with the complications of both. To avoid some of the difficulties of interpreting and relating to man the unique splanchnic, pulmonary, and coagulation responses of the dog in shock, the baboon is used as a subhuman primate model for these studies.

As an illustration of the types of experiments conducted, some of the work has involved investigation of the relative efficiency of saline, albumin, and whole blood in treating hemorrhagic shock. The differences between saline and lactated Ringers solution in correcting the acidosis of hemorrhagic shock have also been evaluated. Additional studies have been conducted to investigate the role of shifts in the hemoglobin dissociation curve in compensating for acute anemia and shock. This may offer a new means of enhancing responses to a variety of states of inadequate oxygen delivery to the tissues.

The work in gram-negative septic shock has led to an interest in the relationship between coagulation and hemodynamic changes in E. Coli septicemia. The effect of this type of septic shock on pancreatic endocrine function is also under study, including investigations of the use of adrenergic blockade in alleviating the hypoinsulinemia and hyperglycemia encountered in acutely injured casualties.

Participation in these activities promotes continuous learning experience. Review of pertinent literature is essential. New techniques and concepts open doors to fresh approaches to these pressing problems. Another important source of stimulation and learning is the opportunity provided for contact with other investigators throughout the medical world. Collaborations and frequent consultation with Navy and civilian researchers are an exciting corollary of this assignment.

The goal of all this activity is the achievement of the best possible patient care, which can be accomplished productively by application of concepts learned to the training of medical personnel. Therefore, the major value of a period of participation in research is the experience which the participant takes back to his subsequent assignments in the hospitals, to be shared, and to stimulate others in the wards, operating rooms, conference rooms, and in other daily interchange with colleagues.

While NMRI is administratively separate from the Naval Hospital, Bethesda, there is an increasingly close relationship between the two. A number of hospital surgical residents have been assigned to the Experimental Surgery Division for periods up to six months, to participate in full-time research under the guidance of the NMRI staff. In addition, there is a program concerned with teaching of clinical surgical technique in the laboratory for all of the residents. Instruction is provided by hospital and NMRI staff surgeons. The investigators of the Experimental Surgery Division also participate in hospital teaching and patient care, and form an integral part of the hospital surgery service.

If research is considered to be inquiry, then the value of experience in research lies in the expansion of the habit of asking questions. This habit exerts its greatest impact at the bedside. The development of an inquiring attitude and the stimulation of this attitude in others is the ultimate result of training in a research activity. Increasing numbers of staff personnel with this experience throughout naval hospital teaching services will result in improved patient care and greater personal satisfaction for everyone involved.—Code 71, BuMed.

RIGHT ATRIAL AND PULMONARY ARTERY PRESSURE AS INDICATORS OF LEFT ATRIAL PRESSURE DURING FLUID THERAPY FOLLOWING HEMORRHAGIC SHOCK IN THE BABOON

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The optimal volume of fluid replacement is of concern in resuscitation of the patient in shock. To achieve the maximum beneficial effect on cardiac function within the limits of safety, it is necessary to assess continuously the ability of the heart to accept and circulate this volume.

Right atrial pressure (RAP) monitoring has been advocated as an index for estimating the volume of fluid required to support filling pressures of both ventricles during resuscitation. However, the relationship between right and left atrial pressures (LAP) in this situation has not been completely evaluated. It is possible that a period of shock may alter myocardial function in such a manner as to change the relationship between pressures in the right and left atria during infusion of fluid. In this event, it might be difficult to predict accurately changes in the LAP on the basis of RAP monitoring during resuscitation.

It has been suggested that pulmonary artery pressure (PAP) or LAP monitoring may be more reliable and each has been used clinically in selected cases.

The role of the nature of the infusion fluid on the reliability of PAP and RAP as indices of LAP has received little attention. It is conceivable, for example, that rapid loss from the vascular space of a portion of non-colloid containing fluid could make RAP a less reliable index of LAP during saline infusion than during the infusion of whole blood.

To more fully explore these issues, a study was designed with the following aims:

(1) To evaluate and compare RAP and PAP measurements as predictors of LAP during and after the rapid infusion of fluid following hemorrhagic shock.

(2) To investigate the effect of the nature of the fluid infused on reliability of LAP predictors.

(3) To investigate the rapidity with which different fluids elevate RAP during resuscitation.

Materials and Methods

The adult male baboon (*Papio doguera*) weighing between 18 and 30 Kg. was the test animal. For each experiment, to facilitate handling, the animal was tranquilized, while still in a cage, with an intramuscular injection (1mg./Kg.) of Sernylan.*

A. Insertion of Monitoring Catheters

Each animal initially underwent left thoracotomy under nitrous oxide-oxygen-Anectine** endotracheal anesthesia. Siliconized vinyl catheters for central pressure measurements (o.d.=.065) were placed in the thoracic aorta via the left subclavian artery, which was sacrificed, and through purse-string sutures, into the pulmonary artery and both atria. The catheters were filled with 1.5 cc. of a concentrated heparin solution. The free ends were ligated and placed subcutaneously on the lateral aspect of the left side of the thorax.

B. Preliminary Procedures

After a two- to three-week recovery period, the baboon was again tranquilized. Additional general anesthesia necessary to maintain a lightly anesthetized condition, was 25 mg. increments of Pentobarbital sodium USP, intravenously. Under local anesthesia, a plastic, siliconized catheter (PE 205) was inserted via the femoral artery into the thoracic aorta and through the femoral vein into the inferior vena

Submitted for publication January 3, 1969.
From the Bureau of Medicine and Surgery, Navy Department, Research Task No. MR005.19-0004.

The experiments reported herein were conducted according to the principles enunciated in "Guide for Laboratory Animal Facilities and Care."

The opinions or assertions contained herein are the private ones of the authors and are not to be construed as official or reflecting the views of the Navy Department or the Naval service at large.

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* (I—(phenylcyclohex) piperidine HCl, Parke, Davis.
** Succinyl choline chloride—USP, Burroughs Wellcome.

cava. The animal was then placed in the prone position with the anterior chest wall protected by padded axillary supports. Under local anesthesia, the four thoracic catheter ends were exposed, remains of the concentrated heparin solution aspirated, and the catheters were filled with 1.5 cc. of dilute heparin solution. Each chest catheter was connected to a pressure transducer (Sanborn 267B) and by means of a preamplifier (Sanborn 350–3000B) and a direct writing multichannel polygraph (Sanborn 350), pressures were continuously recorded simultaneously from the four chest catheters. The transducers were positioned approximately at the level of the right atrium. Each pressure recording system was calibrated against a mercury manometer before and after every study. The animals were not heparinized.

C. Experimental Model

a. *Hemorrhage.* The study was divided into three periods: baseline, hemorrhagic shock, and resuscitation. After a 30-minute baseline period, hemorrhagic shock was induced by removing blood through the femoral artery catheter into a sterile plastic bag containing 67.5 cc. of ACD solution, at a rate adjusted to reduce mean arterial pressure to 60 mm. Hg over a 15-minute interval. This pressure was maintained for 60 minutes. Additional blood was then removed over a 5-minute period to further reduce mean arterial pressure to 35 to 40 mm. Hg for 70 minutes. Pressure was regulated by withdrawing or returning blood as required.

b. *Treatment Groups.* On the day prior to study, each animal was placed in one of four treatment groups by random selection. Treatment began in all groups at the completion of the shock period and was partitioned into four 30-minute intervals, T_1, T_2, T_3, T_4, as shown in Figure 1. These intervals were alternated with 30-minute observation periods. The four treatment groups were as follows:

No Treatment Group (Group O). These animals received no treatment following the end of the shock period.

Whole Blood Group (Group 1). The shed blood was reinfused into these animals and additional amounts of freshly drawn, citrated, group specific, homologous baboon blood were given as required during treatment periods T_1 through T_4. The blood, when given, was infused at an average rate of 130 cc./min. A maximum of 250 cc. was drawn from each donor. The criteria for infusion of all test fluids are described in detail below.

Colloid Group (Group 2). Animals in this group received, as required, an infusion of 5% human serum albumin in saline during treatment periods T_1, T_3, and T_4, at an average rate of 115 cc./min. During treatment period T_2, the animals' own red cells were returned after being washed in isotonic saline and packed to a hematocrit of 70%. No other fluid was given during treatment period T_2.

Saline Group (Group 3). Animals in this group received, as required, an infusion of 0.9% NaCl during treatment periods T_1, T_3, and T_4, at an average rate of 160 cc./min. During treatment period T_2, the animals' own red cells were returned as in Group 2, after being washed in isotonic saline and packed to a hematocrit of 70%. No other fluid was given during treatment period T_2.

c. *Infusion Protocol.* Test fluids in the three treatment groups were infused until either the mean arterial pressure had returned to baseline value or until the mean right atrial pressure was 7 mm. Hg higher than baseline, at which time the infusion was halted. Infusion was resumed whenever arterial pressure fell below baseline *and* the mean right atrial pressure did not exceed baseline by more than 4 mm. Hg.

D. Data Collection

During each experiment, 10 data collection points (S_1 through S_{10}) were scheduled as indicated in Figure 1. At each of these points, pressures were read from the polygraph and recorded. Cardiac output was estimated by the dye dilution method, and blood samples were drawn for chemical analysis. This is a report only of the pressure relationship in the three treatment groups observed during the initial treatment period (T_1) and the subsequent data collection points. The remainder of the data will be reported separately. All data were recorded on coding sheets and punched on cards for subsequent analysis on the Univac 418 computer.

Results

General Observations

There were 33 baboons in the three treatment groups. The bleed-out volume for each group was similar as shown in Figure 2. The volume of fluid required for resuscitation was considerably higher in the saline treated animals than in the other two groups.

In Figure 3, the mean values of MRAP, MPAP, and MLAP for each treatment group is plotted at the 10 sampling points. In each group, mean values fell below controls during hemorrhagic shock (sample 3 through 6), and rose during resuscitation (sample 7

through 10). Standard deviations were large. In general, mean values during resuscitation in blood and colloid treated animals were higher than in saline treated animals. Using an analysis of variance and the observations from S–2, S–7, S–8, S–9 and S–10, this difference, when considered as a deviation from baseline, was significant for MLAP (F test $p<0.01$) only.

Observations During Treatment Periods T_1

Figure 4 shows continuous pressure tracings of the four chest catheters in three representative baboons receiving either whole blood, saline, or 5% human serum albumin during the first treatment period (T_1). In each group, aortic pressure rose promptly when infusion was begun, but baseline values were not always achieved during T_1. RAP, however, invariably rose, and then fell whenever the infusion was interrupted. This resulted in an intermittent infusion of fluid, based on the change in RAP in accordance with the infusion protocol described.

These tracings show that pressures in the RA, PA and LA appear to rise synchronously to peaks with the infusion of fluid, and fall when the infusion is interrupted. Saline treated animals responded differently from the others on at least two counts. First, it was necessary to resume the infusion more often with saline as compared to other fluids, and secondly, a greater volume of fluid was required.

One explanation might be that although aortic pressure rose considerably in saline treated animals, it did not quite return to baseline during T_1 and, thus by protocol requirements infusion was continued. On the other hand, the pressure did usually return to baseline during this period in animals treated with whole blood or colloid. It was thought that another possible contributing factor for the more frequent infusions of saline may have been that it was given more rapidly (average 160 cc./min.) than were blood (130 cc./min.) or colloid (114 cc./min.), thus possibly leading to a more rapid rise in RAP and earlier cessation of infusion. Then if the subsequent drop in RAP were more rapid in the saline animals, possibly because of loss of saline from the vascular space, the result would be a pattern of more frequent, shorter infusion periods.

Against this possibility is the observation that mean time from the beginning of the infusion to the first peak for saline was greater (8.1 minutes), despite more rapid infusion, than for colloid (5.8 minutes), or whole blood (6.2 minutes). In order to study this phenomenon more closely, plots were made of the rate of rise of MRAP during the first peak against the infusion rate as shown in Figure 5. The slopes of regression lines for the three treatment groups were significantly different, ($p<0.01$). Saline treated animals had the lowest slope, indicating that at comparable infusion rates, the MLAP actually rose less rapidly in the saline group. Furthermore, the rate of decrease of MRAP during the first minute following the first peak was about the same for the saline group (3.78 mm. Hg/min.) as for the colloid and whole blood groups (3.15 mm. Hg/min.). The difference was not significant ($p>0.25$). Thus, the evidence suggests that differences between saline treated animals and colloid and whole blood animals, in terms of frequency of infusion and volume infused, cannot be explained on the basis of more rapid infusion of saline.

Figure 6A shows the relation between changes in mean left atrial pressures and changes in mean right atrial pressures observed during T_1. Figure 6B shows the relation between changes in MLAP and changes in mean pulmonary artery pressure (MPAP). Half the points were obtained by taking the difference between the mean pressure at the first peak and the mean pressure just prior to the beginning of infusion. The other half were points obtained by taking the difference between the mean pressure one minute after the peak and the mean pressure at the peak. The differences are positive for the rise in pressure, negative for the fall. Both ΔMRAP and ΔMPAP are highly correlated with ΔMLAP. Since intercepts were not found significantly different from zero, the slopes are those obtained by least squares fits in which the intercepts are constrained to be zero. The slopes of the regression lines for the three treatment groups were not significantly different from each other. Pooling of the data was therefore possible.

Observations following T_1 (S–7, S–8 and S–10)

As shown in Figure 1, sampling points 7 through 10 each occurred 15 minutes following the end of a resuscitation period. The data obtained at those points, therefore, differ from those for T_1, when fluid was being rapidly infused and represents a contrast between a "stressed" heart and a "resting" heart.

In Figure 6C, the relationship between ΔMLAP and ΔMRAP is shown from the sampling periods S–7, S–8 and S–10. The difference is taken from the end of shock (S–6). In contrast to the relationship observed during T_1, the slopes of the lines of regression for the three treatment groups are significantly different from each other ($p<0.01$) and are shown separately. The scatter about each of the lines is also greater. Despite greater scatter, the general relation-

ship between ΔMLAP and ΔMRAP, measured during treatment period T_1 as compared to S–7, S–8, and S–10, remained similar. In fact, if the difference between treatment groups is ignored the resulting pooled slope of 1.39 is very close to the value of 1.35 obtained from period T_1.

The relationship between ΔMLAP and ΔMPAP during resuscitation is shown in Figure 6D. In this instance, it was permissible to pool data from the three treatment groups, since lines of regression were not significantly different from each other ($p>0.1$). There is, however, a considerable scatter about the line. This slope is not significantly different from the regression calculated for treatment period T_1, indicating that the relationship between ΔMLAP and ΔMPAP during treatment period T_1 and the subsequent periods is similar.

In both Figure 6C and 6D, pressures in the saline treated animals cluster about the lower end of the regression line. In the blood and colloid treated animals, in contrast, there was a tendency for pressures to be distributed along the entire regression line. For example, referring to Figure 6C, the highest ΔMLAP in the saline group is 8mm. Hg, whereas the highest in the colloid group is 21mm. Hg. This is another way of viewing the data presented in Figure 3, which shows that the saline treated animals had a significantly smaller increase in MLAP than the other two groups during resuscitation. This is especially interesting since saline treated animals received more than twice as much fluid as the other two groups.

Discussion

The relationship between pressure changes in the two atria during infusion of fluid has previously been studied in the unshocked dog. Several investigators including Henry *et al.*, Gowdey *et al.*, and Ferguson *et al.*, reported data suggesting that a rough correlation exists in open and closed chest preparations, and over a broad range of blood volumes. Hanashiro and Weil, showed that in the unshocked dog, during the infusion of fluid, changes in pressures in the left atrium were approximately twice those on the right. Berglund, in contrast, emphasized that pressures in each atrium reflect the functional state of its respective ventricle only. If each ventricle were individually stressed, the relationship between the atrial pressures became difficult to predict.

Clinically, Fishman *et al.*, studied a group of postoperative patients who had undergone mitral valve replacement. Simultaneously RA and LA pressures were recorded. LA pressures were maintained at high levels with infusion of fluid to support an adequate cardiac output. They observed that the pressure changes in the atria were not always correlated. In another clinical study, Tristani *et al.*, measured simultaneous RA and left ventricular end diastolic pressures in patients with "medical shock" including myocardial infarction. They observed that changes in the left ventricular end diastolic pressures were accurately reflected by changes in the right atrial pressure. This was true even in patients with isolated left ventricular disease.

Hardaway, in studies of shock in man and the dog, found simultaneous monitoring of RAP and PAP helpful. He reported elevations of PAP preceding changes in RAP during infusion. It has been postulated that these observations represent effects of multiple microthrombi in the pulmonary capillary bed.

Data from this present study of the shocked baboon indicates that both ΔRAP and ΔPAP are highly correlated with ΔLAP. During treatment period T_1, when the heart was being stressed by infusion of fluid, similar regression equations were derived for both ΔRAP and ΔPAP when plotted against ΔLAP. In long-term observation, measured when the infusion had been periodically interrupted, the relationships were again similar, although the scatter was greater. From a clinical standpoint, these experimental data suggest that RAP monitoring is as informative as PAP monitoring, and both in general reflect changes in LAP. On the average, changes of 1 mm. Hg on the right reflect a change of 1.4 mm. Hg on the left, when all the treatment groups are considered together during resuscitation.

Following the first interruption of the infusion during period T_1 there was a drop in central pressures the magnitude of which during the first minute was similar in all groups. This suggests that the initial event in recovery is a redistribution of fluid within the vascular space. In the long run, however, central pressures tended to be more sustained in colloid and blood treated animals than in saline treated animals. This is probably because of a greater shift of saline into the extravascular space.

The long run relationship between ΔRAP and ΔLAP appears to be different in the different treatment groups (Fig. 6C). We have no clear explanation for this but the clinical implication is that a rise in right atrial pressure may reflect a larger rise in LAP in a patient treated largely with colloid and blood than in a patient treated largely with blood and saline. The fact that these differences could not be demonstrated in the relationship between ΔPAP and ΔLAP may well be due to the fact that variation within treatment groups was sufficiently larger in

these regressions to mask differences of the magnitude found in the ΔRAP regressions. It does not imply that ΔPAP is a more reliable predictor than ΔRAP since the overall scatter was similar for both prediction equations when treatment groups were pooled. It is appropriate, however, to emphasize as Berglund has, that many factors encountered clinically may alter the relationships between pressure changes measured on the right side, and ΔLAP. One of these factors in hemorrhagic shock appears to be the choice of resuscitation fluids. This factor, however, is probably not of sufficient importance to suggest any major modification in the clinical interpretation in the central pressures monitored during fluid therapy.

The high correlation between changes in RAP (or PAP), and changes in LAP indicates that on the average the ΔLAP can be predicted if the other variable is known. However, for the *individual* observation as contrasted to the average, this prediction is only approximate since the standard error of y as shown in Figure 6C, is large (4.67 mm. Hg). For example, if the ΔRAP were 10 mm. Hg, the 95% confidence range of ΔLAP would be from 4.56 mm. Hg to 23.2 mm. Hg. It should be emphasized that in management of the individual patient, the issue is not the exact level of LAP, but rather that the pressure not be inadvertently forced above a safe level during resuscitation. On the basis of data in Figure 6, a probability graph (Fig. 7) has been constructed, plotting pressure changes in the RAP and PAP against probability that ΔLAP exceeds 20, 30, or 40 mm. Hg. This graph (Fig. 7A) shows that when the ΔRAP is 15 mm. Hg, the probability of producing a ΔLAP of 40 or greater is less than one chance in one hundred. However, when the RAP is elevated to 30 mm. Hg, the chances become greater than 60 in one hundred. This conforms with the current standard clinical practice of halting fluid infusion whenever RAP rises 10 or 15 cm. of H_2O. A similar relationship was found for ΔPAP (Fig. 7B).

The rate of rise in MRAP was directly related to the rate of infusion. This is in agreement with earlier work. Of more interest was that, at comparable infusion rates, the rate of rise was considerably faster in animals receiving colloid or blood as compared to those receiving saline. This may be due to a more extensive loss of saline from the intravascular space during infusion. From a clinical point of view, the faster rise in atrial pressure in animals receiving colloid solutions requires that monitoring of right atrial pressure be especially careful when the colloid solutions are administered to avoid inadvertent atrial hypertension and subsequent pulmonary congestion.

Inasmuch as the baboon has not been extensively studied with regard to hemorrhagic shock, it is of interest to mention several differences between responses in the baboon and the dog. It has been reported that RA and PA pressure in the dog initially fall during hemorrhagic shock and subsequently often rise above control values without treatment. It has also been reported by Henry *et al.*, that these values tend to be elevated above control after reinfusion of the animal's own blood. In the baboon, on the other hand, these values remain below control during shock (Fig. 3), and rise only to control levels with infusion of blood. It has been postulated that this right atrial and pulmonary hypertension in the dog is due to pulmonary congestion and abnormally high vascular resistance analogous to splanchnic congestion also common in the shocked dog, but not in man. There was no evidence that pulmonary congestion followed shock or resuscitation in the baboon in our studies or in those of Abel *et al.*

Summary

Resuscitation from hemorrhagic shock was studied in baboons in which siliconized catheters had been chronically implanted in the right atrium, pulmonary artery, left atrium and aorta. Animals were treated in a random sequence with either whole blood, 5% albumin plus washed red cells, or 0.9% saline and washed red cells. The relationship between pressure changes in the RA, PA and LA were studied. It was found that:

(1) ΔRAP and ΔPAP were highly correlated with ΔLAP but the large standard error made individual predictions difficult.

(2) There is no evidence suggesting that PAP monitoring should be more informative than RAP monitoring.

(3) RAP rises more rapidly at comparable rates of infusion when blood or 5% albumin is infused than when saline is infused.

(4) During intervals when fluid was rapidly infused, pressure changes produced by the three kinds of fluid were not significantly different. Over the long run saline treated animals showed smaller increases in LAP from the end of shock.

(The figures and references may be seen in the original article.)

THE GASTROENTEROLOGIST CORNER—THE MEDICAL MANAGEMENT OF ULCERATIVE COLITIS

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The medical management of patients with chronic idiopathic ulcerative colitis is symptomatic and empirical. Because of the wide clinical spectrum of chronic ulcerative colitis (CUC) treatment may vary from administration of antidiarrheal agents and tranquilizers, as used in control of functional diarrhea, to total colectomy and ileostomy. All treatment, however, is predicated on the knowledge that the clinician is dealing with CUC and not the colitis of a specific bacterial, parasitic, or ischemic etiology. The first step in management is to establish the correct diagnosis. The diagnosis of ulcerative colitis can be made in over 90% of cases on sigmoidoscopy, and in many cases the extent of the disease can be appreciated on viewing a scout film of the abdomen.

I have found it useful to divide CUC into three groups of clinical severity: mild, moderate, and severe. The vast majority of patients seen in clinical practice have mild colitis defined by radiographic or sigmoidoscopic evidence of disease correlated clinically with three-to-four diarrheal stools per day, a fever below 101°F, and no weight loss or anemia. Moderate colitis encompasses those patients with two of the following signs and symptoms: persistent, often bloody diarrheal stools with more than six movements per day, fever over 101°F, weight loss of five or more pounds, anemia, and hospitalization lasting more than one week in order to control the disease. The severe cases include those patients with three or more of the above signs and symptoms, or those who present with toxic megacolon.

The diarrhea in mild cases is often easily controlled with agents such as Lomotil, paregoric, or codeine. Restriction of vegetable fiber matter may be as useful as antidiarrheal agents after the first couple of days. A useful adjunct for control of diarrhea is the administration of colloid powders such as Metamucil.

Although the routine avoidance of milk is not necessary, a lactose tolerance test should be performed in all patients with CUC in order to identify those who have lactase insufficiency. Milk ingestion in those patients will exacerbate the diarrhea and exaggerate abdominal distension and cramps. Other agents which are helpful in controlling symptoms in mild cases of CUC include antispasmodics, salicylazosulfapyridine (Azulfidine), and Prednisone enemas. The latter are particularly efficacious in patients with disease limited to the rectum (ulcerative proctitis). These enemas are given before bedtime with the instruction to the patient to retain the enema for at least forty-five minutes. Azulfidine will likewise prove very beneficial in patients with pancolitis of a mild nature and in whom systemic steroid therapy is not considered necessary. Unfortunately some patients note side effects from Azulfidine which include nausea, rash, and headache, and the rare patient with glucose-6-phosphate dehydrogenase deficiency will develop a hemolytic anemia. The adequacy of low-dose sulfa preparations for effective maintenance therapy has recently been shown.[1]

The psychiatric aspects of CUC are well known, although controversial. It is important for the physician to understand that he is treating a patient who may have been psychiatrically distrubed before the onset of the colitis or who may become emotionally upset because of his disease. In either case these patients become very dependent on their physicians and need constant support.

Patients with moderate CUC require more aggressive treatment. Hospitalization is the rule, and Prednisone in a dose of 40–60 mgm per day initially is recommended. If a patient presents a history of peptic ulcer, one might try to use Azulfidine (6–8 grams per day in divided dosage). Many reports in the literature attest to the effectiveness of Azulfidine in acutely ill patients. Electrolyte disturbances and anemia should be corrected with intravenous fluids, oral iron, or blood transfusions.

While glucocorticoids may control the inflammation and bring about a remission, serious complications of ulcerative colitis may also be masked during Prednisone therapy. It is essential that objective signs and indicators be followed closely when a patient is acutely ill. Electrolytes, hematocrit, abdominal girth, and the serum albumin are important parameters. If abdominal distention is noted, daily upright films of the abdomen should be viewed to ensure recognition of toxic megacolon or a colonic perforation.

Reduction of the steroid dose is recommended as the patient improves since there is no evidence that

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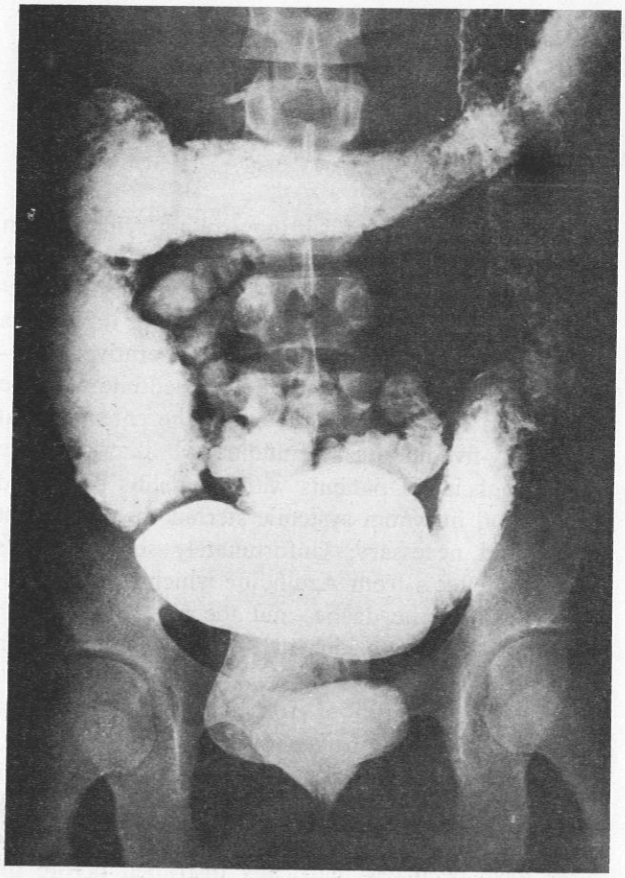
The opinions expressed herein are those of the author and cannot be construed as reflecting the views of the Navy Department or of the Naval Service at large.



Barium enema study in a case of acute diffuse ulcerative colitis. Note the multiple ulcerations and pseudopolyp formation in the transverse and descending colon.

long-term maintenance steroid administration prolongs the periods of remissions or prevents relapses.[2] Occasionally, however, an apparently pharmacologically insignificant dose may be required to keep that patient free of symptoms.

Patients with severe colitis are gravely ill. Meticulous attention to detail is mandatory in caring for these patients. As mentioned above steroids may mask symptoms, and the physician and patient may not appreciate the gravity of the disease until too late. Physical examination may be relatively unrevealing yet toxic megacolon or even perforation may occur without any increase in symptoms. Intravenous ACTH (40–80 units in one liter of 5% dextrose and water over an eight-hour period) is the mainstay of therapy initially; it should later be replaced by Prednisone. Daily abdominal X-rays must be obtained and studied to ensure that neither perforation nor toxic dilation has occurred. Barium enema examinations and antispasmodics are best avoided in these acutely ill patients since either of these measures may precipitate toxic megacolon.

Fever over 103°F is a frequent manifestation of severe ulcerative colitis. While the inflammatory process is probably responsible for much if not all of the fever, secondary bacterial infection may play a role; accordingly some clinicians employ broad spectrum antibiotics in very ill patients. Many patients with severe CUC will respond to a regimen consisting of ACTH, Prednisone, correction of fluid, electrolyte and blood deficits and antidiarrheal agents, but those patients who have not made marked improvement after 7–10 days should be considered surgical candidates.

All severe cases of ulcerative colitis should be seen by a surgical consultant on admission to the hospital in anticipation of possible colectomy. The patient with severe colitis should be psychologically prepared for surgery even though he may not require surgical intervention. Should colectomy be considered necessary, visits from a person similar in age and sex from a local ileostomy club are often helpful in allaying the anxieties and fears of an ileostomy.

It should be emphasized that if a patient with severe colitis does not show objective evidence of improvement after a week to ten days in the hospital, surgery is indicated. Administration of steroids often lulls the patient and his physician into a false sense of security.

Recently, immunosuppressive drugs have been used in patients with ulcerative colitis. Because there have been very few studies and none which involved large numbers of patients, no definite conclusions can be drawn at the present time. The initial results, however, are encouraging. In one recent report three of ten patients who had been unable to achieve a remission on steroids, experienced symptomatic and sigmoidoscopic improvement after approximately 300 mg of azathioprine daily were given for a few weeks. In a fourth patient with severe colitis azathioprine produced a remission. Steroids were then introduced, but after three weeks the patient's condition worsened, and azathioprine was reinstituted resulting in rapid improvement once again.[3]

Because of the well known increased evidence of carcinoma of the colon in adults with ulcerative colitis beginning in childhood and in patients having this disease for more than ten years, annual sigmoidoscopy of the rectal mucosa is advised. Random biopsies have been reported to show atypical changes that may lead to the diagnosis of a carcinoma in the rectum itself or at a site in the more proximal colon.[4] Barium enema examinations probably need not be performed annually, but these should be obtained in any one in whom a relapse occurs.

Only general guidelines may be set forth, since each patient will present his own special medical and psychiatric problems. It is hoped that from this review the physician caring for patients with CUC will better appreciate and understand the features of this disease and rationale for treatment.

REFERENCES

1. Lennard-Jones, J. E., Connell, A. M., Baron, J. H., Jones, Avery F.: Controlled Trial of Sulphasalazine in Maintenance Therapy for Ulcerative Colitis. *Lancet* 1:185–188, 1965.

2. Misiewicz, J. T., Cohnell, A. M., Baron, J. H., Jones, Avery F.: Prednisone as Maintenance Treatment for Ulcerative Colitis in Remission. *Lancet* 1:188–189, 1965.

3. Jones, R. Arden: Immunosuppressive Therapy in Ulcerative Colitis. *Proc Roy Soc Med* 62:499–501, 1969.

4. Morson, B. C., Pang, L. S. C.: Rectal Biopsy as an Aid to Cancer Control in Ulcerative Colitis. *Gut* 8:423–434, 1968.

HEMODIALYSIS ABOARD A HOSPITAL SHIP IN VIETNAM

By LCDR Jack E. Zimmerman, MC, USN, Department of Medicine, National Naval Medical Center, Naval Hospital, Bethesda, Md.

In January 1969, a hemodialysis unit was established aboard the U.S. Navy Hospital Ship SANCTUARY (AH–17).

The hospital itself is a modern up-to-date medical facility contained within a ship. Under ordinary circumstances the hospital has an operating capacity to care for 550 patients, a capacity which could be expanded to 750 beds if necessary. The hospital has three operating rooms, a modern three-room radiology department, a complete clinical laboratory, a cardiopulmonary laboratory and a 20-bed intensive care unit. The latter is extremely well staffed and equipped. The unit has central compressed air and oxygen wall supply systems; and a four-bed cardiac monitoring system.

USS SANCTUARY is unique among Naval vessels in that there are two commanding officers, one for the ship itself and one for the hospital. The hospital staff is composed of 24 physicians, 29 nurses, and 260 hospital corpsmen. Specialties represented include General Surgery, Internal Medicine, Thoracic Surgery, Urology, Neurosurgery, Ophthalmology, Otolaryngology, Radiology, Pathology, Anesthesiology and Orthopedic Surgery.

The ship's primary mission is to provide medical support for American military forces operating in the I Corps area of South Vietnam. This area encompasses the five most northern provinces of South Vietnam and borders on the so-called demilitarized zone (DMZ). In addition the ship provides care for members of the Army of South Vietnam, and a limited number of Vietnamese civilians.

The views and opinions expressed in this article are those of the author and not necessarily those of the Naval Medical Department.

USS SANCTUARY provides medical support in the DaNang area and on a northern station near the demilitarized zone. Patients are transported to the ship, largely by helicopter. There have been over 11,000 helicopter landings on SANCTUARY since its deployment in Vietnam in mid-1967. Patients are received directly from the field or from less well equipped medical Battalions and Field hospitals.

Facilities

At the time that the dialysis unit was established there existed aboard the SANCTUARY only two corpsmen with limited prior experience with hemodialysis. A Kidney Team composed of ten hospital corpsmen was formed on a voluntary basis. These young men learned to manage all aspects of dialysis very rapidly and proved themselves to be extremely capable assistants.

Equipment consisted of a single Travenol Twin Coil Kidney. Disposable coils and arterial and venous lines were used. Dialyzing fluid was prepared utilizing commercially available concentrates. Two Harvard Infusion Pumps were used to provide regional heparinization. Arterial-venous shunts were established by members of the surgical staff. A dialysis room, adjacent to a medical ward, was used for dialysis in some cases, but the majority of patients were so ill, that the dialysis was carried out in the intensive care unit.

Problems unique to dialysis aboard a hospital ship were soon encountered. The absence of suitable fittings for water sources and drains resulted in the use of a "bucket brigade" technique for dialysis bath changes.

The ship's tap water content was found to be unique by virtue of the fact that the fresh water supply was obtained by distilling sea water. The absence of trace minerals was considered to pose a potential source of difficulties but in no case were any problems encountered. The lack of magnesium in the water was compensated for by the presence of MgCl in the dialysis salt concentrate. Due to chlorination and the addition of an acidic concentrate to the fresh water supply to prevent pipe fouling, the pH of the dialysis bath fluid was found to be markedly acidic. It was necessary to adjust bath pH to normal by the addition of 5 to 15 ml of concentrated sodium hydroxide. While this did not appreciably alter the electrolyte content of the bath, it did necessitate adjustment of pH following each bath change.

On several occasions the kidney machine, like most other portable equipment, had to weather heavy seas. Except for the occasional need for a mop after an especially large swell, no real difficulties were encountered.

Because of the remoteness of the ship's operating area from the usual suppliers of dialysis equipment, it was remarkable that no major difficulties were encountered in obtaining supplies. At the time when the unit was established material on hand was scarce; however top priority ordering resulted in prompt supply. Thereafter, anticipation of future needs maintained adequate supply channels.

Patients

During the period between January 1969 and January 1970 a total of 25 patients were referred to the dialysis unit. One patient expired shortly after arrival; two patients did not require dialysis; and three were managed by peritoneal dialysis. The remaining 19 patients were treated by hemodialysis.

The causes of renal failure were as follows: blackwater fever, 2 cases; heat stroke, 3 cases; burns, 1 case; post-traumatic, 12 cases.

In the majority of cases occurring after trauma a single specific etiology for the renal failure could not be determined since shock, massive blood transfusion, and sepsis were all present. One additional case was referred because of barbiturate intoxication. This patient was dialyzed for 17 hours and recovered.

Patients ranged in age from 18 to 33 years. There were 16 American military personnel and three Vietnamese Army personnel. The mortality rate for all hemodialysis patients was 48%. There were no mortalities among the non-traumatic cases, however, the mortality rate in the 12 post-traumatic cases was 66%. Half of these patients died within the first 24 hours of hospitalization (Table I).

Most patients who survived were managed throughout their oliguric phase aboard the USS SANCTUARY. When stability was achieved or when the diuretic phase was entered, air evacuation to a Pacific Command Hospital in Japan or the Philippine Islands was accomplished. On two occasions patients were stabilized and evacuated while still oliguric because of an influx of patients exceeding the capabilities of the unit and its single machine. All patients were eventually evacuated to the continental United States.

Table 1.—Clinical Diagnosis and Mortality of Patients Treated by Hemodialysis

	Total	Died	
Acute Renal Failure Following Trauma	12	8	(66%)
Acute Renal Failure Following Burns	1	1	(100%)
Blackwater Fever	3	0	
Heat Stroke	2	0	
Drug Intoxication	1	0	
Totals	19	9	(48%)

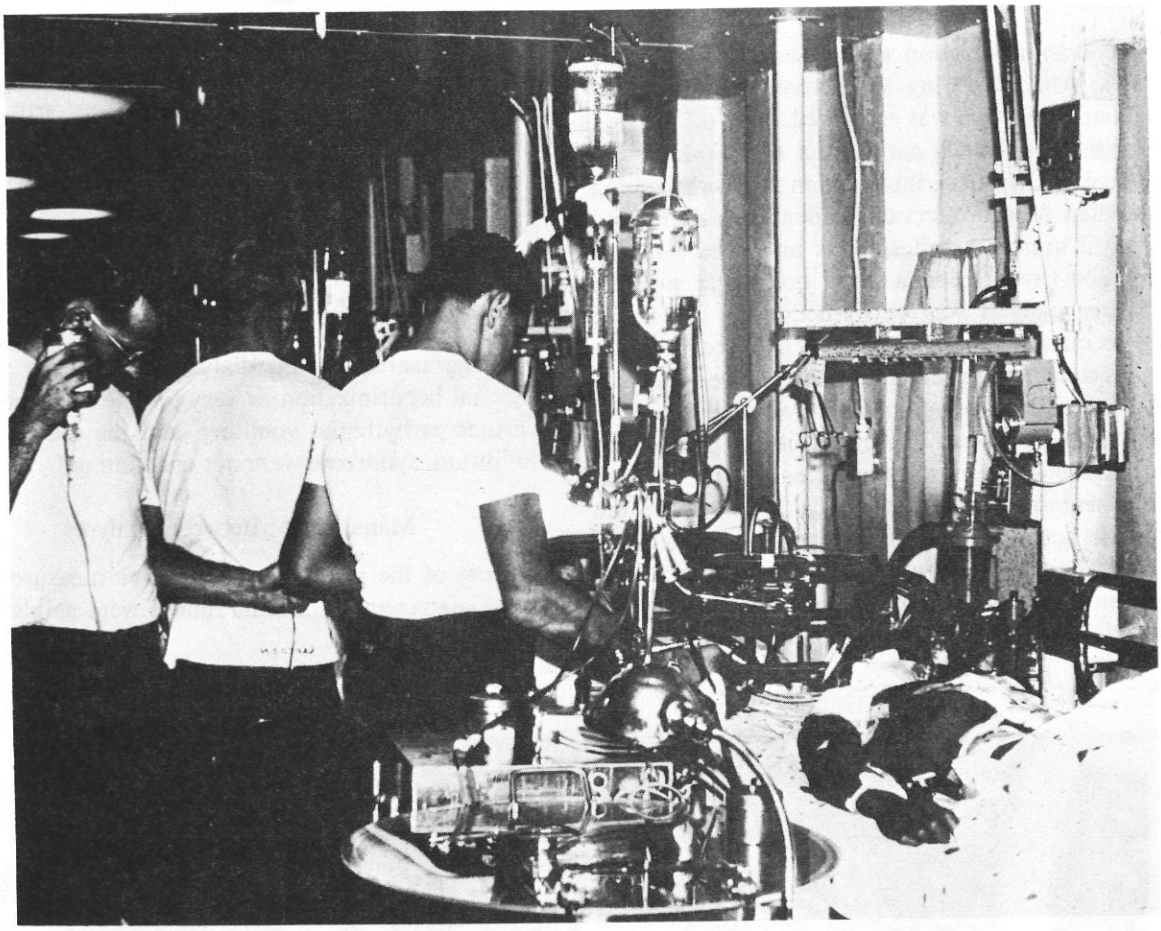
Patient Evaluation

On admission to the Dialysis Unit each patient was examined for signs and symptoms of uremia, overhydration and bleeding. Wounds were inspected, cultured and redressed. Each patient received an electrocardiogram, chest X-ray and blood chemistry evaluations. These included electrolytes, blood urea nitrogen, creatinine and bilirubin determinations. A complete blood count, platelet count, and prothrombin activity were also determined.

These parameters were followed serially throughout hospitalization. Blood was usually drawn from the arteriovenous shunt by a member of the Kidney Team in order to prevent frequent venipuncture and thus preserve veins for a second shunt should it be necessary.

Each patient was carefully evaluated to rule out prerenal insufficiency and obstructive uropathy.

All catheters were irrigated to exclude outflow obstruction. When the nature of wounds was such that the integrity of the bladder or ureters was in doubt, cystoscopy, retrograde ureteral catheterization and retrograde pyelography were performed by the Urologic Department. Patients who were anuric since



shortly after injury and had suffered abdominal wounds involving the retroperitoneal area, received particular scrutiny in this regard. Two such patients underwent these procedures and in both instances the urinary system was found to be unobstructed.

Records of previous blood and fluid administration were reviewed in all cases to detect excesses or deficits. If prerenal azotemia was suspected on these grounds or if hypotension, tachycardia and clinical appearance suggested a volume deficit, central venous pressure monitoring was instituted. When pressure was low or normal and respiratory status satisfactory, blood or plasma was infused cautiously. Saline was used when overhydration was not apparent. If no urine output appeared with improvement in circulatory status, 25 Gms of mannitol or 100 mg ethacrynic acid were given. Patients who did not respond to these measures were treated for acute renal failure.

The ratio of blood urea nitrogen to creatinine was of no value in these patients in distinguishing between prerenal azotemia and intrinsic renal disease. The ratio was invariably above the usual 10:1 relationship because of the patient's marked catabolic response to trauma, bleeding, and infection.

Dialytic Techniques

Dialysis was employed when uremia, overhydration, or Stage IV drug-induced coma were present; when the blood urea nitrogen exceeded 150 mg per 100 ml; or when the serum potassium, despite other forms of treatment for hyperkalemia, exceeded 6.5 mEq per liter. Early and frequent dialysis was employed to prevent uremia and acidosis, and to correct electrolyte disturbances which developed throughout hospitalization. Hemodialysis was preferred in the presence of multiple abdominal wounds, peritonitis, sepsis and hypercatabolism. When overhydration existed, ultrafiltration was employed.

The Scribner arteriovenous shunt was used for all dialyses. These shunts were usually inserted into a radial artery and forearm vein, although often because of fractures, fragment wounds, amputations or the presence of thrombophlebitis from previous intravenous therapy it was necessary to establish a

shunt between the posterior tibial artery and a leg vein.

General heparinization was utilized in the majority of cases; when bleeding was present however, regional heparinization was employed.

Dialysis was usually carried out for a 6-hour period, except when drug intoxication or overhydration necessitated longer intervals. Patients were dialyzed daily until uremic manifestations and otherwise uncontrollable hyperkalemia were no longer present. Thereafter dialysis was performed every 48 to 72 hours to maintain the patient in a non-uremic state. This practice greatly enhanced the patient's awareness, state of well being, and allowed earlier mobilization in many cases. The capability of performing such frequent dialyses was made possible by the high level of motivation and technical skill which the corpsmen achieved and their constant availability. On several occasions it was necessary to dialyze one patient in the morning and re-prime the machine for a second patient in the afternoon and evening.

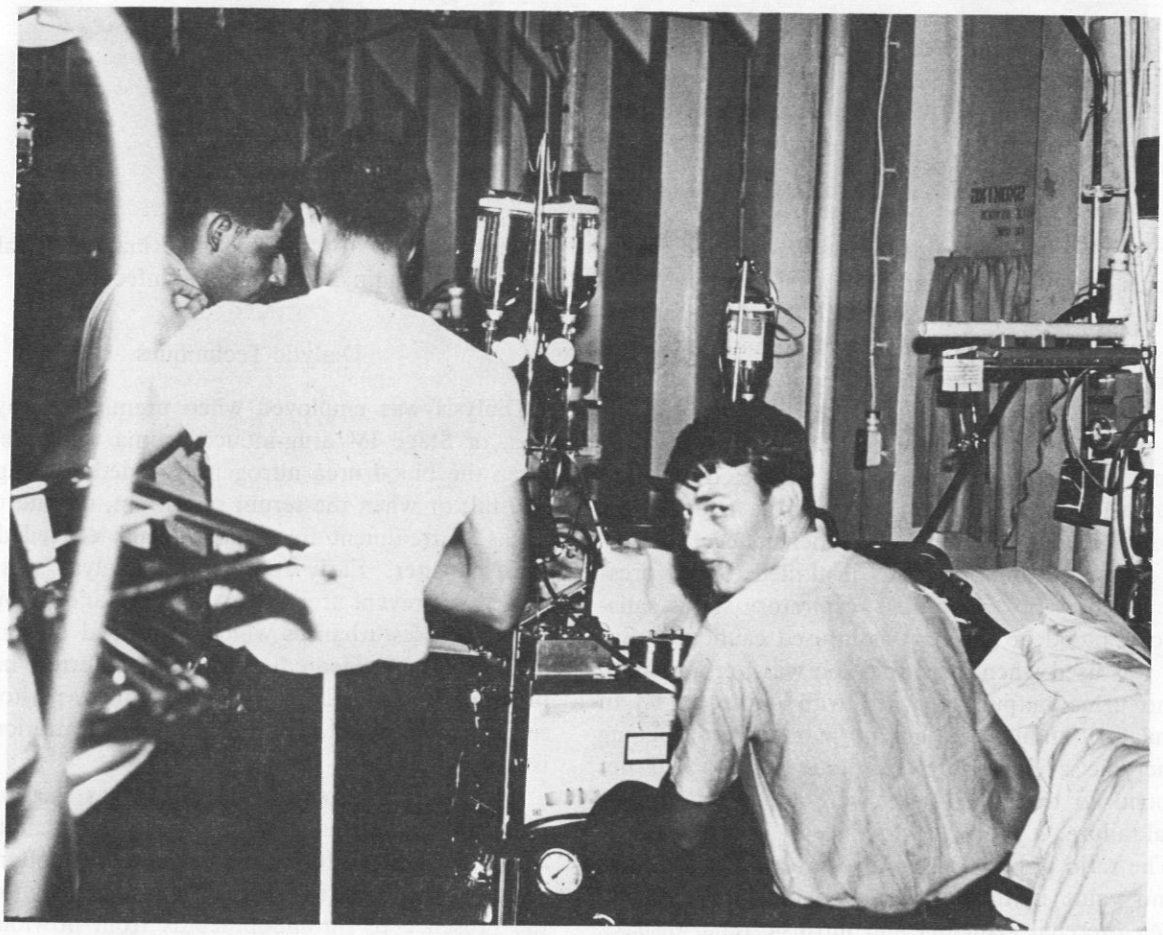
Technical Difficulties

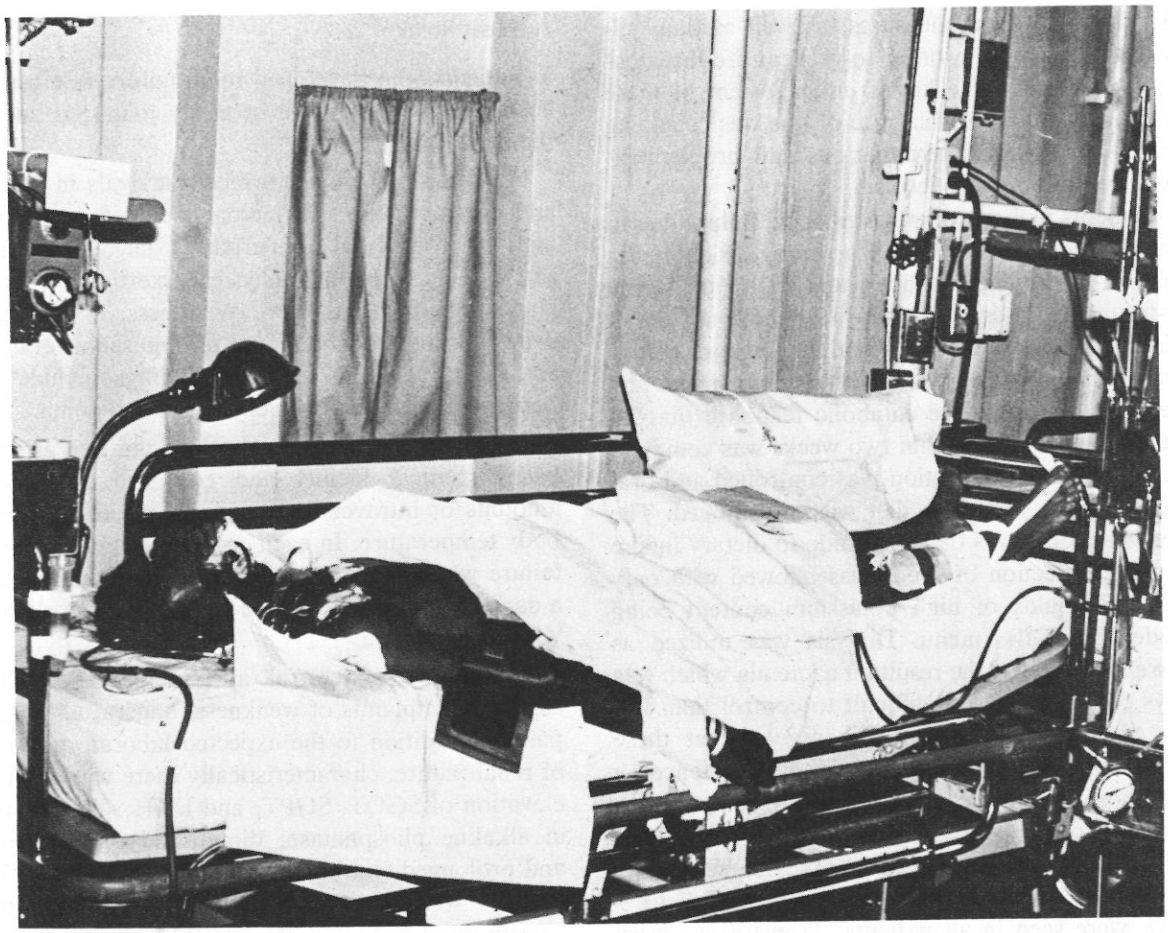
Technical difficulties encountered during dialysis included clotting within the machine, rupture of the dialysis coil, and hypotension. Hypotension was easily managed by infusion of saline during dialysis. When clotting or coil rupture occurred, dialysis was immediately terminated and the patient disconnected from the machine. No patient complication resulted when these difficulties occurred.

Bleeding from heparinization was not encountered; however in three instances antecedent bleeding was aggravated during dialysis despite the use of regional heparinization or very low doses of heparin. Cardiac arrhythmia, vomiting, and the dialysis disequilibrium syndrome were not encountered.

Management Between Dialyses

Most of the standard conservative measures used in the management of renal failure were employed in these patients.





Careful attention was paid to fluid balance. Measured losses were replaced in addition to an allowance of 300 to 400 ml of water, the average daily requirement for oliguric patients. Daily weights were of value in evaluating water balance in the relatively uncomplicated cases. It was often impossible to obtain daily weights, however, in patients with post-traumatic renal failure because of traction apparatus, and daily weights were difficult to interpret in those patients who required amputations, changes of multiple bulky dressings or casts which were removed or applied. In these cases intake and output records and serum sodium concentration were the only available guides to maintaining water balance.

All patients received water-soluble vitamins, including vitamin K, as a supportive measure and to offset any losses that might result from dialysis.

At least 100 Gms of glucose were given either intravenously or orally in order to prevent starvation ketosis. Larger doses, up to 200 Gms, were given to post-traumatic cases in an attempt to diminish protein catabolism and the rate of rise of blood urea nitrogen, as well as to aid in controlling hyperkalemia.

Hyperkalemia was problematic primarily in the post-traumatic cases. These cases in the period immediately following injury had tremendous rates of rise in serum potassium. This was attributed to massive tissue breakdown associated with a catabolic response to stress, bleeding, hemolysis, sepsis and massive blood transfusion. In several cases all of these factors were present simultaneously. One such patient was documented to have a serum potassium rise of 1.5 mEq per liter over a 6-hour period.

Infusion of glucose, sodium bicarbonate and insulin were used when electrocardiographic changes or levels of serum potassium indicated a life-threatening situation.

The sodium-cycle polystyrene resin, Kayexalate, was used when emergency measures had controlled dangerous levels of serum potassium or when the rate of rise was such that dangerous levels were likely to be approached. Fifty to 100 Gms were suspended in water and given rectally as a retention enema. After two to four hours a cleansing enema was given. In three cases enemas had to be instilled into an end colostomy and manually retained.

At times, all these measures, as well as daily dialysis were required in order to prevent life-threatening hyperkalemia. The key to management of these cases was to establish what rate of rise was occurring by serial potassium determinations and prophylactically prevent dangerous levels.

In patients with uncomplicated renal failure due to malaria or heat stroke, dietary protein restriction was employed to minimize acidosis and azotemia. In the post-traumatic cases oral intake was often not possible initially because of abdominal wounds or complications. Such patients were severely wounded and underwent such a severe catabolic response that 20 to 30 lbs. weight loss within two weeks was common. When complicating infection was controlled and oral intake possible, a regular diet was encouraged. The patient's appetite was the best guide to dietary intake and a free selection of foods was allowed with only foods and liquids of high potassium content being excluded from the menu. Dialysis was utilized as necessary to combat the resultant azotemia which was always considerably less difficult to control than initially. Shortly after beginning a regular diet these patients appeared generally improved, experienced a great boost in morale and their wounds began to granulate rapidly.

All patients were anemic during the course of their renal failure. Hemoglobin concentrations of 7 to 9 Gm % were seen in all patients. Transfusions were given regularly at the end of dialysis to maintain these levels. If hemodynamic difficulties were encountered or dyspnea appeared, packed red cells were transfused. When bleeding occurred or major surgery became necessary during the course of oliguric renal failure, transfusions using the freshest blood obtainable were administered. In addition prophylactic measures were instituted to prevent hyperkalemia.

Early mobilization was encouraged and all patients became ambulatory as soon as their clinical status and wounds would allow. Special attention was given to wound care, control of trachealbronchial secretions, and the prevention of bed sores. Frequent mouth care was given to prevent ulcerations. The patients were given chewing gum to stimulate salivary flow and prevent parotitis as well as to abate the discomfort of strict fluid restriction.

Diseases and Complications

The nature of the basic etiology of renal failure and subsequent complications determined the prognosis and outcome among these patients. Mortality rose in direct proportion to the severity of wounds and the complications thereof.

A. Heat Stroke

Patients who developed renal failure as a result of heat stroke were the most easily managed and had the most benign course.

All these patients were recent arrivals in Vietnam and common etiologic factors included exposure to high environmental temperatures, lack of acclimatization, and strenuous physical exertion. A typical clinical picture was seen. Weakness, and dizziness were followed by abdominal and muscular cramping and later by coma. Physical findings included hyperthermia, tachypnea, tachycardia and coma.

Initial therapy was received at the nearest shore based medical facility and consisted of judicious amounts of intravenous fluids and rapid lowering of body temperature. In each case the diagnosis of renal failure was promptly recognized. The appearance of a dark brown urine followed by oliguria and azotemia was characteristic.

At the time of referral, all patients were well except for complaints of weakness, nausea, and muscle pain. In addition to the expected laboratory findings of renal failure, characteristically there was a marked elevation of SGOT, SGPT, and LDH; slight increase in alkaline phosphatase; diminished platelet count; and prolonged clotting and prothrombin times. These findings were attributed to muscle necrosis and a consumption coagulopathy secondary to heat stroke. The massive muscle necrosis produces myoglobinuria which is thought by some investigators to be the cause of renal failure.

With the exception of one patient who developed a pharyngitis due to Klebsiella, no complications were encountered. Dialytic and general management were not difficult and recovery occurred rapidly.

B. Blackwater Fever

These patients had characteristic symptoms of falciparum malaria and in addition had noted red or black urine and decreased frequency of urination prior to admission.

They presented marked anemia and ring forms of Plasmodium falciparum were demonstrated only with difficulty, a usual problem in the diagnosis of blackwater fever.

Although a total of eight cases of blackwater fever were seen on SANCTUARY during 1969, only two patients did not respond to mannitol infusions and required dialysis. Because of the high incidence of chloroquine-resistant falciparum malaria in Vietnam, quinine sulfate was administered in all cases.

Dosages in patients with renal insufficiency ranged from 1.3 to 1.9 Gms daily, but in the oliguric patients dosages were reduced to 600 mgs of quinine dihydrochloride daily. This was administered in a slow intravenous infusion over a 24-hour period and was continued for 14 days. Continuous cardiac monitoring and frequent electrocardiograms were utilized to avoid cardiotoxicity.

Except for a hypercatabolic response early in their illness, these patients were relatively easy to manage and developed no complications.

C. Post-Traumatic

These patients as a group accounted for all the mortalities among the patients who were hemodialyzed. Within the group the mortality and number of complications increased in proportion to the severity of the injury.

Four patients presented gunshot wounds, and all of these resulted from high velocity missiles. Three of these patients survived and all had similar abdominal wounds. The colon and small bowel were penetrated in each case and resections of varying extent were necessary. In addition to renal failure, the wounds were complicated by pelvic abscess (2 cases); wound infection (3 cases); septicemia (2 cases); septic arthritis (1 case). The patient who did not survive had required a left hepatic lobectomy as a result of his wound. His course was complicated by pulmonary edema due to overhydration, cardiac arrest, and gastrointestinal bleeding. Although he survived for three weeks he subsequently succumbed to pneumonitis due to pseudomonas aeruginosa.

Six patients presented multiple fragment wounds. These injuries were caused by grenade explosion (2 cases), claymore mine explosion (2 cases), and in 2 cases the wounds were of uncertain origin. The single survivor in this group had relatively slight wounds in one leg which caused vascular impairment with subsequent gangrene. His course was complicated by pulmonary edema due to overhydration, pseudomonas wound infection, septicemia, and septic shock. During the course of his renal failure he underwent three major operative procedures, two amputations and finally a hip disarticulation, necessitated by wound infection.

All the patients who died had suffered massive injuries. Multiple fragment wounds of the extremities, abdomen, chest and face, often with extensive internal injuries, were presented. Two of these patients required hepatic lobectomy and one patient had 17 bowel perforations. Multiple major fractures were common and extremity amputation was frequently necessary. One patient presented fractures of the humerus, radius, and ulna of one arm, a fractured femur and fibula in one leg and complete destruction of the entire pelvic brim on one side.

All of these patients had been in severe hypovolemic shock and as many as 40 units of whole blood were used during resuscitation and initial surgery. Three patients died within 48 hours of wounding, two survived between five and seven days and one lived for three weeks.

Complications were frequent within the group and in each case. Septicemia was the most frequently encountered and was the direct cause of death in four patients. Other complications included wound infection, systemic fat embolism, pulmonary thromboembolism, gastrointestinal bleeding, pneumonitis, atelectasis and hepatic failure.

One patient developed renal failure as a result of burns and shock. Although the extent of his burns was not great (35%), the respiratory tract was injured and became a site of bacterial invasion. Death was caused by septicemia terminating in shock. Another patient who survived only five hours after referral had sustained a fractured pelvis and lacerated sigmoid colon in a motorcycle accident one week previously. He too died as a result of sepsis.

Conclusions

The USS SANCTUARY during the year 1969 served as one of the two referral centers in South Vietnam for patients requiring hemodialysis. During this period 25 patients were referred to the unit and 19 were hemodialyzed.

The need for hemodialysis facilities close to combat zones is emphasized by the fact that nine of these patients were too ill to be evacuated by jet aircraft to Pacific Command Hospitals.

Mortality rate was high among the post-traumatic cases because of the severity of their injuries and the frequency of complications. Septicemia was the most frequent complication and was the direct cause of death in 80% of the cases.

This suggestion from the field concerns a tripod device to be used with the N-K exercise table which permits Quadriceps Progressive Resistive Exercise to be done at various levels between a true isotonic and a true isometric regimen.

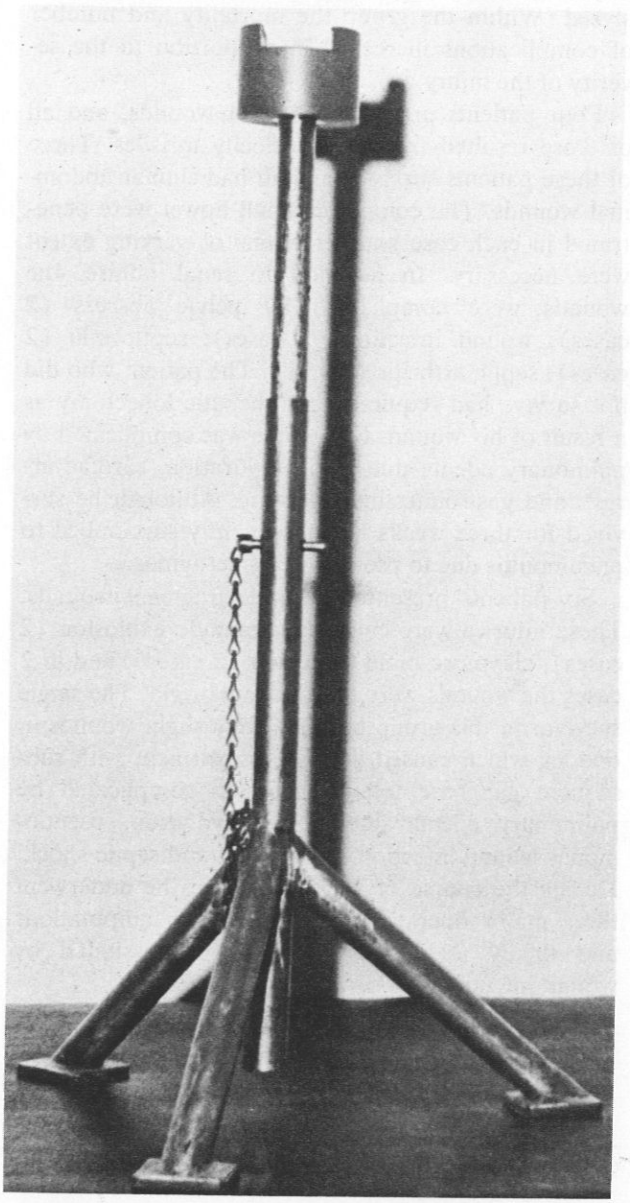
A TRIPOD FOR USE WITH THE N-K TABLE

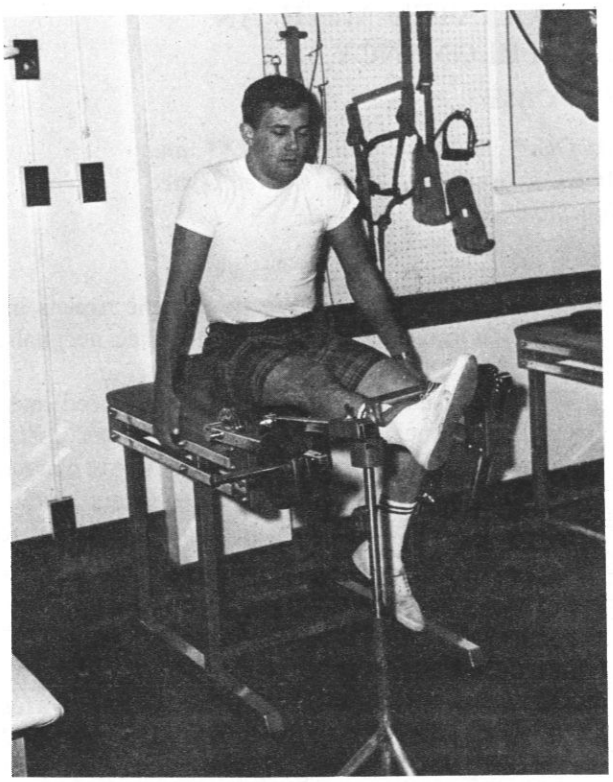
By LCDR Patsy L. McKelvy, MSC, USN, Naval Hospital, San Diego, California.

In the Physical Therapy Department, Naval Hospital, San Diego, a method whereby Quadriceps Progressive Resistive Exercise (PRE) could be done at several levels between a true isometric and a true isotonic regimen on the N–K table, was devised. Two objectives were identified: (1) Quadriceps PRE through a specific range of motion such as through the final 30° or 45° could be provided and (2) Progressive Resistive Exercise could be begun isometrically early in the treatment program and advanced through an increasing range as the patient's tolerance and range of motion permitted.

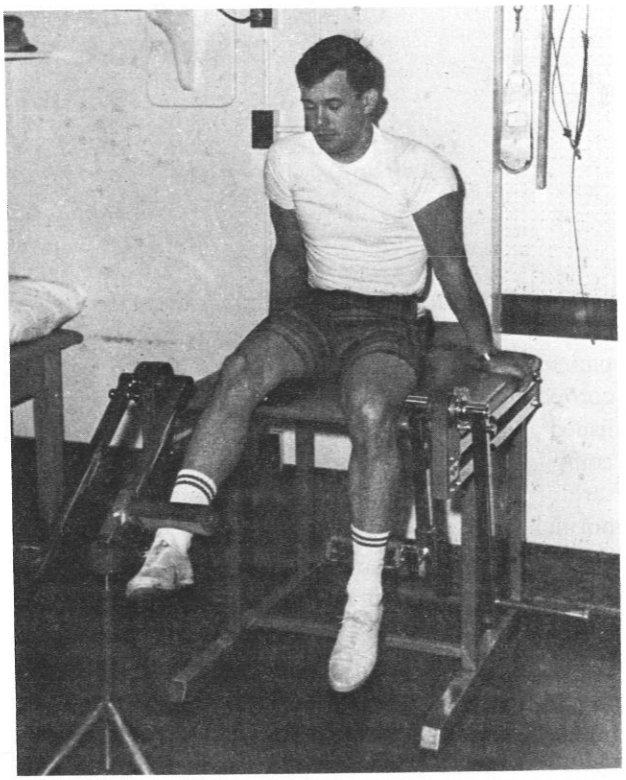
The problem and basic sketch of such a device were presented to the Naval Hospital Maintenance Division. The illustrated tripod was constructed and has proved most effective (see Figure 1). The inner lever of the N–K table rests in the groove atop the tripod and the resistance device is lifted from the tripod by the Quadriceps mechanism to complete knee extension. Adjustments on our tripod place the top of the tripod at the following heights from the floor: 18″, 20″, 23″, 26″, 29″ and 33″. Material chosen for the tripod assured corrosion resistance and durability for heavy-duty use. The tripod base and legs are of tubular stainless steel with rubber pads under each leg. The post is a solid stainless steel rod which fits inside the tube; these were drilled simultaneously to facilitate proper fit of the adjustment pin. The material selected for the top of the post was "P.V.C. Plastic Rod" in three inch diameter. This material is quite durable yet slightly resilient to withstand the repeated lowering of heavy weights onto it.

It is felt that similar devices could be constructed from less expensive materials if necessary and might be of value to any Physical Therapy Department which does a large volume of Quadriceps PRE work.





The tripod as it is set to perform isometric quadriceps progressive resistive exercise.



The tripod as it might be set to perform quadriceps progressive resistive exercise through the final 40° range of motion.

CNO MESSAGE 042140Z SEP 70 TO NAVOP:

"1. Based on vigorous support by our Secretary of the Navy, the President recently signed an Executive Order which suspends the legal limitation on the percentage of officers in the Navy who may be recommended for promotion from below the promotion zone. Prior to the suspension the number of below zone selections to the grades of Lieutenant Commander through Captain was limited to not more than 5 percent of the number of selections authorized to the grade concerned. With the removal of the statutory limitation the below zone percentage limit will be established by administrative action. The percentage however will not exceed 15 percent for any grade. The prerogative to select up to the authorized percentage will of course remain with the Board. The Line Captain Selection Board which is in session has been authorized by SecNav to select up to 15 percent from below the zone. This is another step forward in the Navy's program to recognize high performance through visable accelerated promotion opportunity. E.G. ZUMWALT, JR., Admiral, U.S. Navy, Chief of Naval Operations."

OVARIAN LUTEIN CYSTS ASSOCIATED WITH AN OTHERWISE NORMAL PREGNANCY

REPORT OF A CASE

CDR Thomas A. Daane, MC, USN, FACOG, Aron O. Lurie, MD,** and CAPT Robert K. Barton, MC, USN, FACOG†.* *Reprinted from Obstet Gynec 34(5):655–663, November 1969.*

The occurrence of massive lutein cysts during the early course of normal gestation is described. The patient's surgical treatment is compared to that accorded 12 similar gravidas, as gleaned from ten published reports. Preservation of the pregnancy is accomplished only by proper identification of the nature of the grossly cystic ovaries and diagnosis of the normal intrauterine pregnancy.

In the past, lutein cystic enlargement of the ovaries (hyperractio luteinalis) was thought to be found in association only with hydatidiform mole, chorioepithelioma, or rarely in adenoma of the pituitary gland.

Bilateral ovarian enlargement by multiple lutein cysts has been reported in pregnancy associated with erythroblastosis as well as a stillborn fetus with multiple congenital anomalies and large placenta containing hyalinized chorionic villi. In this latter case report, Downing concluded that if bilateral lutein cysts are discovered to be associated with pregnancy, the uterine contents should be evacuated with the odds favoring abnormal contents.

The first reports of lutein cyst ovarian enlargement as an incidental finding, or complicating an otherwise normal pregnancy, involved 2 twin gestations. These, together with subsequent case reports are tabulated (Table 1). A triplet pregnancy is included in the tabulation inasmuch as the placentas were regarded as histologically normal, even though the triplets included 2 normal fetuses and an acardiac acephalic monster.

This report is of a patient who experienced massive intraperitoneal hemorrhage at 10 weeks' gestation from torsion and rupture of an ovary enlarged by cysts lined by luteinized theca interna and granulosa cells. Our patient provided an opportunity to study serial blood and urine hormone levels after ovarian ablation early in pregnancy.

Case Report

J. M., a 35-year-old, gravida 12, para 3, abortus 8, was admitted to our institution on Mar 29, 1967 with a complaint of aching lower abdominal pain of 3 days' duration, which had become more severe on the morning of admission. The LMP had begun on Jan 2, 1967. The only relevant past history was that of multiple uterine curettages for missed or incomplete spontaneous abortions. The patient was in only mild distress, afebrile, and normotensive, with a normal cardiac rhythm and rate. Her abdomen was distended, imparting a doughy sensation to palpation. Minimal tenderness to direct palpation was elicited in the left lower quadrant. Bowel sounds were present but infrequent. The uterus was enlarged to 10 weeks' gestational size associated with a vague mass in the left adnexa extending into the cul-de-sac. A right adnexal mass could not be defined by several examiners.

A Gravindex pregnancy test on admission was positive. The hematocrit was 35% and hemoglobin 11.9 g/100 ml. The WBC was 12,600/cu mm with 88% polymorphonuclear cells, 5 band forms, and 7 lymphocytes. The blood group was Type A, Rh positive and VDRL was negative. Urinalysis was within normal limits. The chest X-ray was normal. Radiologic evaluation of the abdomen was read as dilated loops of small and large bowel with much fecal material in the descending colon.

During the ensuing 24 hr, the physical findings remained unchanged except that the pain had localized more to the lower left quadrant. The first indication of blood loss was noted 32 hr after admission, at

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Presented at the Seventeenth Annual Armed Forces District Meeting, ACOG, San Diego, Calif, Oct 29, 1968.

The authors wish to express their appreciation to Dr. David Charles, Professor of Obstetrics and Gynecology and Chairman of the Department, Boston University School of Medicine, Boston, for his helpful view of this paper.

Submitted for publication Feb 12, 1969.

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which time the hematocrit was recorded at 25%, and hemoglobin was 8.6 g/ml, and confirmed by repeated studies. An infusion of whole blood was started, and the patient was operated upon. Approximately 1000 ml of both fluid and clotted blood was removed from the peritoneal cavity. The left ovary was large, 15 x 12 cm, twisted 1½ times on the infundibulo-pelvic ligament, and bleeding from the surface. The right ovary measured 12 x 10 cm and was replaced by multiple cysts of varying size (Fig 1). The soft cyanotic uterus was enlarged to that of a gestation compatible with dates (10 weeks' gestational size, 12 weeks from the LMP). Bilateral salpingo-oophorectomy was accomplished for a macroscopic diagnosis of bilateral ovarian cyst adenomas. An attempt to aspirate amniotic fluid produced a small amount of bloody fluid. Histologic sections of the right ovary revealed multiple cysts lined by luteinized granulosa-theca interna cells (Fig 2 and 3). The left ovarian morphology was obscured by hemorrhage and necrosis.

The patient's postoperative course was uneventful. Chorionic gonadotrophin titers during the next 4 weeks were reported as 44,800 and 38,720 IU/24 hr, the latter at 15 week's gestation. The patient was readmitted at 20 week's gestation for serial blood and urine steroid hormone determinations which are reported elsewhere in detail.

Two weeks later she presented leaking amniotic fluid. The cervix was dilated 2 cm and 50% effaced. The fetal heart sounds were audible and regular and no uterine contractions were noted. Approximately 20 hr after admission, the patient began a febrile course with an oral temperature of 101.4°F. Smear and culture from the endocervix showed gram positive cocci. Intravenous penicillin and intramuscular streptomycin were started and labor induced with a monitored dilute syntocin infusion. After 8 hr, the patient delivered a 450-g Apgar-2 female infant who lived approximately 5 minutes. Autopsy revealed an immature, otherwise normal female infant. Sections of the placenta and membranes were consistent with chorioamnionitis and placentitis but otherwise showed normal placental histology.

Discussion

Shippel states that some hyperplasia of theca interna cells is a normal concomitant of pregnancy but that the extent and degree has not been clearly defined. Lynch *et al* raise the point that pregnancy may occur without treatment in patients with polycystic ovary syndrome, or in cases of hyperthecosis. Such ovaries may be prone to hypertrophy and luteinization of the thecal area. These authors report a pregnancy in which the histology of the ovary revealed broad sheets of luteinized theca cells in the stroma between and beneath follicle cysts.

"Pregnancy luteomas" were described by Sternberg and may represent functioning tumors distinct from simple theca lutein cyst stimulation. Greene *et al* presented 3 patients with "luteomas of pregnancy," 2 of which were unilateral and 1 bilateral. They interpreted that such tumors arise from luteinized theca cells, are focal in origin, and may be present prior to pregnancy in a nonfunctional state. Evidence of function of these tumors during pregnancy has been documented in which a high urinary 17-ketosteroid excretion was associated with masculinization of a female fetus. The luteomas were identified by biopsy at laparotomy, immediately post partum, and noted to have regressed at a second operation 6 weeks later, when urinary 17-ketosteroid excretion had also returned to a normal level.

Pregnancy associated with significant theca lutein cystic ovarian enlargement may require surgical intervention when abnormal masses are palpated, or in the presence of persistent abdominal pelvic pain, with or without localizing signs. When bilateral cystic masses are discovered, the crucial points in management include recognition of the etiology of the ovarian enlargement and verification of normal pregnancy. The possibility of lutein cystic ovarian enlargement during early pregnancy should be considered. However, mistaken diagnoses are apparent either through gross misinterpretation at laparotomy, or at the time of histologic evaluation. The second ovary in our patient was removed due to the diagnosis of probable bilateral cystadenoma. In 2 other patients, all pelvic genitalia were removed after a histologic diagnosis of granulosa cell tumor was made, one on the basis of frozen section and in the other through misinterpretation of permanent sections.

The establishment of normal intrauterine contents is probably the more difficult problem, since the commonest abnormality associated with enlargement of the ovaries by lutein cysts is hydatidiform mole. The use of a single determination of urinary chorionic gonadotropin was found to be of little use by Hobson unless there was a high titer. Two patients, both with normal single intrauterine pregnancies, had titers which would qualify as highly abnormal. One of these with a high chorionic gonadotropin titer (greater than 2,000,000 MU/24 hr) at 10 weeks'

TABLE 1. OVARIAN LUTEIN CYSTS

Authors	*Yr*	*Pt age*	*Race*	*Gravidity*	*Wk gest*	*Presenting symptoms*
Horner and Young	1955	20	Negro	Abortus 1	8 days p.p.	Asymptomatic masses post partum
Weigle and Thatcher	1955	25	Cauc	Para 2	22	Bilat lower abd pain 6 wk
Rudolph and Barnett	1956	30	Cauc	Para 3	10	Lower abd pain 10 days localized RLQ 1 day
Watson and Demick	1959	26	Cauc	Para 2	14	LLQ Pain
Floyd	1960	23	Cauc	Para 0	24	RLQ Pain 4 hr
Jones and Huston	1961	21	Negro	Para 0	12	Lower abd pain 3 wk
Shettles	1963	22	Cauc	Para 0	Term	Asymptomatic primary cesarean section
		23	Cauc	Para 1	Term	Asymptomatic repeat cesarean section
Bergman	1963	21	Not stated	Para 0	8	Pelvic pain 2 wk
Parker and Fisher	1964	31	Negro	Para 0	Term	Asymptomatic cul-de-sac mass primary cesarean section
		27	Negro	Para 2	39	Asymptomatic repeat cesarean section
Kesler and Callagan	1967	16	Negro	Para 1	10	Lower abd pain 24 hr localized RLQ 12 hr
Present Report	1968	35	Cauc	Para 3 Abortus 8	10	Lower abd pain 3 days more severe LLQ 6 hr

gestation had subsequent assays which were near normal levels at 5 and 8 months' gestation. Novak and Jones state that a steadily increasing titer in the diagnosis of hydatidiform mole is of more importance than a persistently high titer. Wide and Hobson reported that a differential diagnosis between normal pregnancy and hydatidiform mole can be made by comparison of the biologic and immunologic ratio of the chorionic gonadotropin. It has also been demonstrated that the differential diagnosis can be made by injection of a radiopaque substance into the uterus. Aspiration of the uterine contents for amniotic fluid was successfully tried by Wiegle and Thatcher and later advocated by Shettles. This method was attempted at 10 weeks' gestation in our patient without conclusive results. The most promising aid in differentiating a living fetus from a hydatidiform mole was reported by Kesler and Callagan who detected fetal cardiac activity at 10 weeks' gestation by means of a Doppler fetal cardioscope (Doptone).* Because of their ability to diagnose intrauterine pregnancy at this early age, they elected to remove a ruptured right lutein cystic ovary and suture an area of bleeding on the left ovary. The pregnancy progressed to a normal term delivery.

Of the 13 reports tabulated, 8 were associated with delivery of viable infants (Table 1). In five of the latter, the cysts caused no significant symptomatology during pregnancy and were discovered incidentally at cesarean section or post partum. Two of the gravidas whose pregnancies terminated normally were operated at 10 weeks' gestation, one for torsion and the other for hemorrhage of a lutein cystic ovary. One woman was operated at 8 weeks for pelvic pain with the discovery of adnexal masses. Of the 10 infants whose sex was stated, all were female, and none showed evidence of masculinization. Multiple gestation occurred in 4 of 13 gravidas, including 3 sets of twins and 1 set of triplets.

Pregnancy was compromised by torsion and/or hemorrhage of the enlarged cystic ovaries in 6 patients. Except for one, in whom torsion occurred at 24 weeks' gestation, all of their acute complications

* Smith Klein Instrument Company, Philadelphia.

Chorionic gonadotropin	*Ovarian size (cm)*	*Findings & treatment*	*Outcome*	*Fetal sex*	*Wt (g)*
200 MU/24 hr	R 12 × 8 L 12 × 8	Diagnostic Lt oophorectomy	Twins	Not stated	3130 2551
Pos 1:100 Dilution (Friedman)	R 6 × 6 L 6 × 6	Ovarian biopsy needle uterus (6cc clear fluid) hysterotomy	Immature twins	Not stated	(18 cm long)
Not reported	R 12 × 10 L 7 × 8	150 cc blood twisted Rt ovary, Rt S&O resection Lt ovary	Normal pregnancy	F	4660
Not reported	R 12 × 10 L 12 × 10	200 cc blood hemorrhage Lt ovary Suture Lt ovary, hysterectomy	Twins	Not stated	Not stated
Not reported	Enlarged cystic bilat	Twisted Rt ovary. Rt S&O	Premature labor, 5 days postop 2 normal, 1 acardiac acephalic monster	F(2)	
183 IU/ml (Serum)	R 20 × 15 L 20 × 15	Laparotomy & closure Twisted Rt ovary, Rt S and O, resection Lt ovary	Abortion 13 days postop	—	54
Not reported	R 15 × 10 L 12 × 10	No treatment	—	F	3380
1,000,000 IU/24 hr 37 wk	Bilateral cysts	No treatment		F	3370
Not reported	Bilateral fist size	Lt oophorectomy, Rt ovary diagnostic resection	Normal pregnancy	F	2550
11,550 IU/24 hr	R 21 × 12 L 14 × 11	Frozen section granulosa cell tumor Hyst & BSO	—	F	3370
Not reported	R 5 × 3 L 10 × 10	Lt oophorectomy, later hyst & R & SO	—	F	3000
2,000,000 MU/24 hr	R 8 × 8 L 8 × 8	Rt ovary hemorrhage (200 cc blood) Rt oophorectomy suture Lt ovary	Normal pregnancy	F	3980
44,800 LU/24 hr	R 15 × 12 L 12 × 10	1000 cc blood. Twisted Lt ovary. Needle uterus. Bilat. oophorectomy	Premature labor 22 wk	F	450

presented between 10 and 14 weeks. This corresponds to the period in which the uterus is becoming an abdominal organ and the chorionic gonadotropin excretion is reaching a maximum level. Torsion tended to occur only in large ovaries (over 12 cm) and was always unilateral; it involved the right ovary in 3 patients and included the left ovary once. In the case report of Jones and Huston, 20 x 20 cm bilaterally enlarged ovaries were inspected, the cysts recognized and the abdomen closed. The right ovary in their patient underwent torsion and hemorrhage 2 weeks later, requiring reoperation and right salpingo-oophorectomy. This suggests that when large lutein cystic ovaries are discovered during early pregnancy at laparotomy, resection to a more normal size should be considered. Whenever prolonged postpartum follow-up has been recorded, the cysts have been noted to regress spontaneously. Intraperitoneal hemorrhage was mentioned in 4 reports. The amount of intraperitoneal blood was recorded as 150–200 ml in 3; in our patient it measured 1000 ml. The only other case report with this degree of intraperitoneal bleeding from a lutein cystic ovary was one complicated by erythroblastosis with a stillborn hydropic infant. Lower abdominal or pelvic pain was the presenting complaint in all patients with symptoms. With torsion and hemorrhage or both, the pain always becomes more intense and usually localized to the side of the superimposed alteration.

The etiology of multiple theca lutein cysts during pregnancy has not been clarified. In most reports of the tabulated series, where chorionic gonadotropin assays are recorded, these levels are often high at the time of the diagnosis of the cysts (Table 1). However, it has been suggested that elevated chorionic gonadotropin excretion alone is not sufficient to stimulate the formation of lutein cysts. The following observations support this suggestion: Administration of chorionic gonadotropin alone to human beings has not been observed to produce ovarian lutein cysts; significant lutein cyst ovarian enlargement occurs in cases of hydatidiform mole in an incidence of 50–60% and in chorioepithelioma in approximately 10%; and lutein cysts have been observed to arise

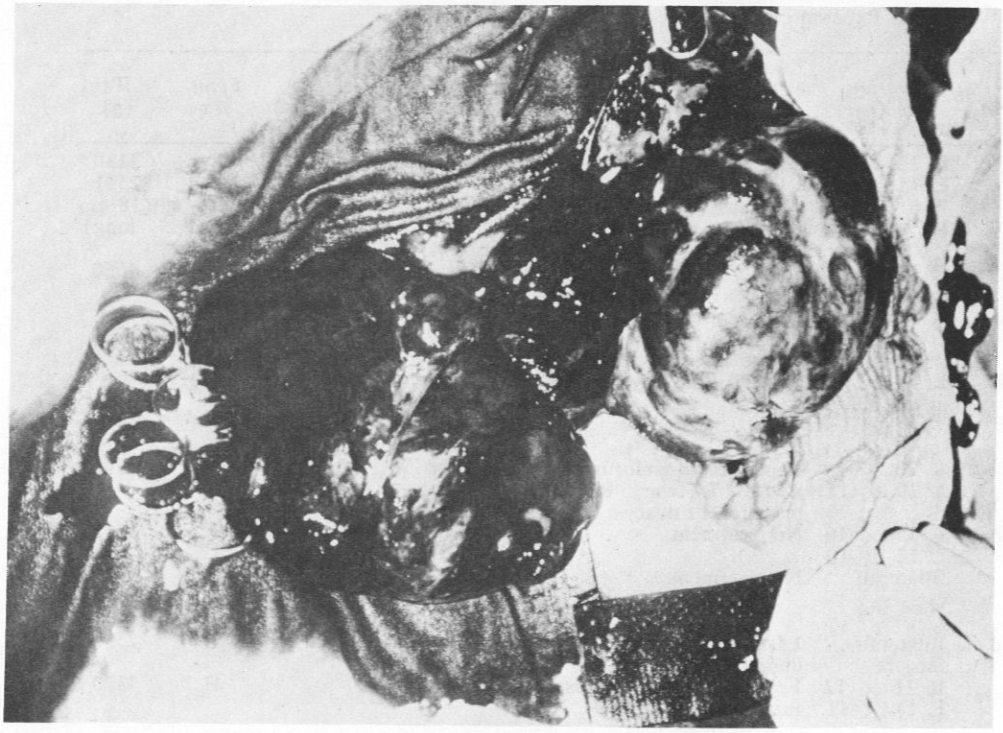


Fig. 1. Gross appearance of ovaries at laparotomy. Enlarged 15 x 12 cm left ovary has undergone torsion with hemorrhage and necrosis. Right ovary is replaced by multiple cysts of varying sizes.

after evacuation of a hydatidiform mole, presumably in spite of reduced chorionic gonadotropin titers.

Sarram feels that a second factor is required in conjunction with chorionic gonadotropin to stimulate ovarian lutein cysts and suggests that this may be follicle-stimulating hormone. The ratio of chorionic gonadotropin to follicle-stimulating hormone could be the key to the stimulation of these cysts. Administration of a hormonal regimen containing anterior pituitary gonadotropin and chorionic gonadotropin to amenorrheic or anovulatory women has been observed to result in ovarian enlargement with multiple thin-walled luteinized cysts.

In erythroblastosis when lutein cysts become manifest, the fetus is hydropic with resulting intrauterine death. Increased chorionic gonadotropin titers have been documented during the third trimester of Rh-sensitized pregnancies. This finding is regarded as a result of retention and hyperplasia of the Langhans' layer (cytotrophoblast). It is possible that the fetal demise is associated with a hormonal change which along with the already increased chorionic gonadotropin stimulates the growth of ovarian lutein cysts.

Conclusions

A normal pregnancy is compatible with significant ovarian enlargement by theca lutein cysts. Theca lutein cystic enlargement of the ovaries should be considered in pregnant patients presenting with lower abdominal-pelvic pain and bilateral ovarian masses, or both. This is especially true if the patient presents in the 10–14 week gestational-age period.

The detection of fetal cardiac activity by means of a Doppler fetal cardioscope appears to be the best method so far reported to differentiate normal intrauterine gestation from hydatidiform mole.

The following principles of management would seem to be applicable when theca lutein cystic ovarian enlargement is discovered in an otherwise normal pregnancy: removal of an adnexa which has undergone torsion with resultant necrosis with or without hemorrhage; resection and–or suture of an area of ovarian rupture with hemorrhage with conservation of the ovary if possible; and when early pregnancy is allowed to continue, resection of large ovaries (greater than 12 cm) to a more normal size should be considered as prophylaxis against later torsion and hemorrhage.

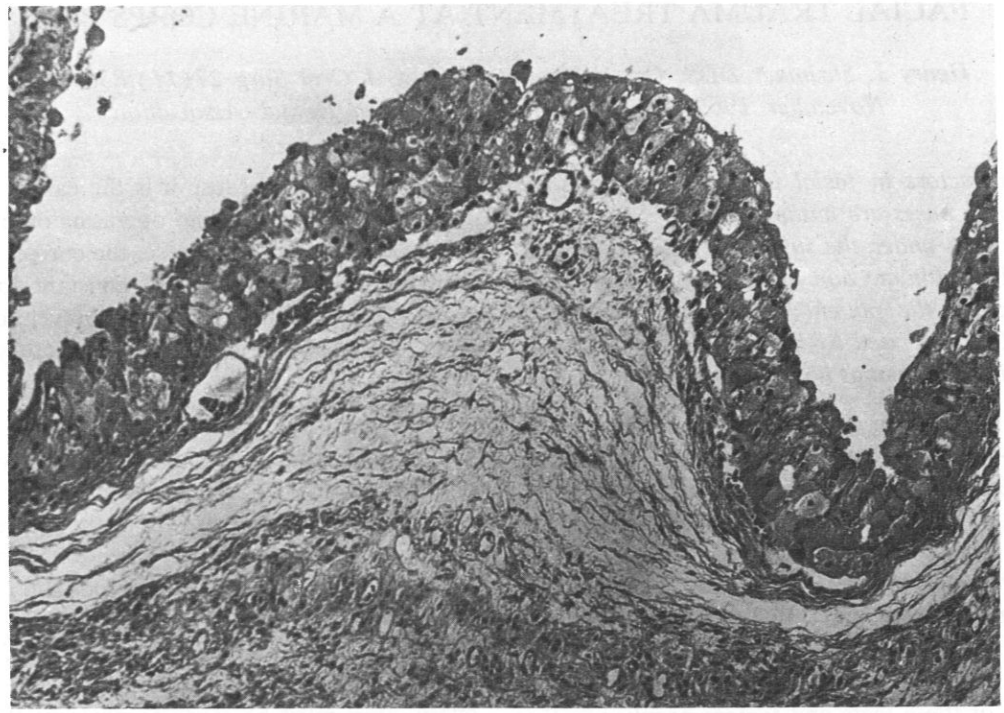
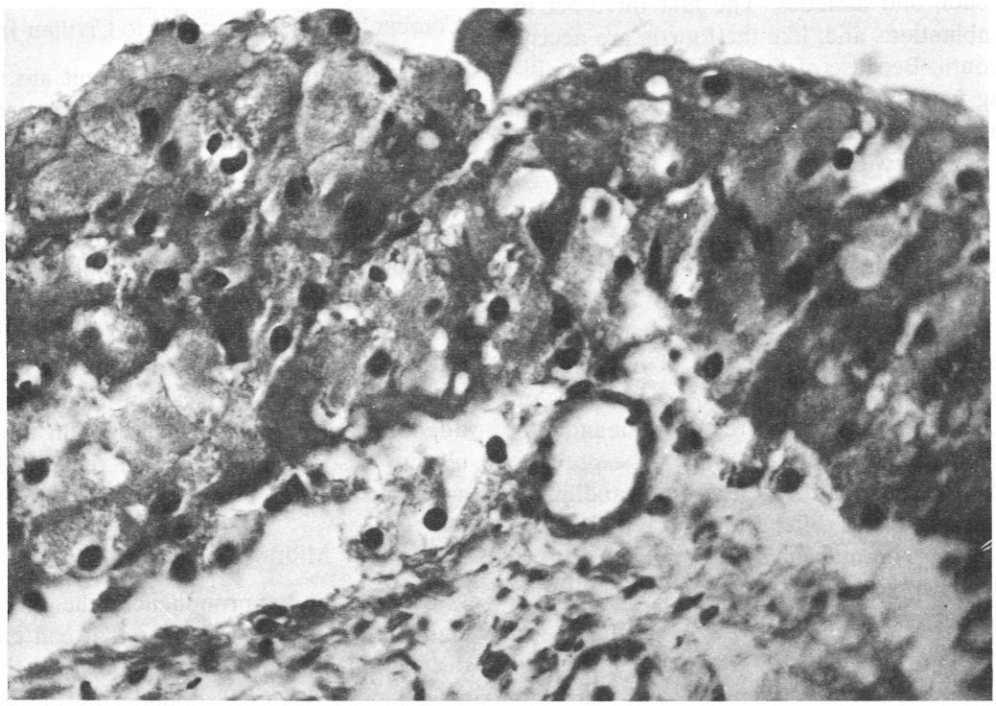


Fig. 2 (top). Photomicrography showing luteinized theca interna and granulosa cell layers of a typical cyst wall, right ovary. (X175) *Fig. 3 (bottom).* Same cyst wall as Fig. 2 showing luteinization lining cells. (X 400)



Summary

The association of theca granulosa lutein cysts with otherwise normal pregnancy is reported. Both ovaries were removed at 10 weeks' gestation and the pregnancy continued to 22 weeks. The literature of this condition is reviewed.

(The references may be seen in the original article.)

FACIAL TRAUMA TREATMENT AT A MARINE CORPS BASE

Henry J. Sazima, DDS, Camp Pendleton, Calif, J Oral Surg 27(11):858–861, November 1969.*

Etiologic factors in facial injuries in patients on Marine Corps bases are automobile accidents, altercations, actions under the influence of alcohol, and athletics. The ultimate aim in treatment is to maintain or restore the patient's health, function, and esthetics. Technics used by hospital personnel are as important in treatment as hospital facilities.

A naval hospital on a Marine Corps base presents a hospital-community relationship that is unique among civilian or other federal communities. It services a military population of more than 50,000. This population is augmented by a community of dependents and retired personnel of 75,000 and proportional populations around satellite marine facilities that swell the total to about 200,000 persons dependent on the naval hospital for health care.

Analysis of these facts and factors peculiar to the naval hospital shows the majority of causes for facial trama to be (along with military training) automobile accidents, altercations, actions under the influence of alcohol, and athletics. The first three act in varying combinations and, like the fourth, are accentuated by youth. Because of the confinement of military training facilities and the men's exuberance, the Marine Corps presents the dental service with a large amount of patients with oral and facial injuries.

Statistics

In 1966, hospital admissions to the dental service were 147. In 1968, admissions rose to 251. More than half, 129, were for major facial trauma. The distribution of injuries is as follows: 24 fractures of the midface that involved the zygoma; 5 fractures of the maxilla; and of the 88 fractures of the mandible, the majority were in tooth-bearing regions, especially involving the third molar. Zygoma and mandibular fractures in young adults differ from those that occur in older patients. The management of such fractures is most often the key to management of multiple facial bone fractures.

Basic Principles

The admonition that the simplest way is usually the best way may delude a surgeon into preferring closed reduction because it is the easiest and usually the most adequate, or into operating on every patient regardless of need. Of course, the correct approach is a blend of both, tempered by constant application of these goals: function, esthetics, prevention of infection, and rehabilitation of the masticatory apparatus.

Dental Apparatus Injuries

Probably the most overlooked area of facial trauma treatment is the procedures that are readily available for the preservation of the injured teeth and their supporting structures. Since function is our first goal, it is important, whenever possible, to maintain a natural dentition and at least preserve the teeth to support a dental prosthesis. Often, splinting with endodontic therapy may be required. In any event, every effort must be made to preserve the teeth and alveolar process to aid prosthetic rehabilitation. However, one cannot treat jaw fractures as a purely dental problem. They are an orthopedic problem.

Combat Trauma Compared to Civilian Injury

Although the goals of treatment are the same for all injuries, the principles for attainment may vary greatly. In general, the following have been noted: in civilian injuries, most often all the anatomic structures although deranged usually can be replaced in a normal position (this is not true for most ballistic wounds); wound drainage in combat wounds is mandatory, whereas it is required seldom if ever in civilian injuries if dental and soft tissue infection is eliminated and suitable supportive therapy is ordered; and multiple fractures, that can be treated with open reductions and bone wiring in civilian injuries, probably are best treated by closed reductions in combat situations.

Lateral and Midface Injuries

Because of its prominence, the malar or cheek eminence is subject to forces that can cause fracture dislocations of the zygoma or disrupt the zygomatic articulations with all boundaries of the orbit and maxilla. Our oral surgery section's review of 180 fractures of the zygoma, zygomatic arch, and walls of the orbit substantiate the observation that this fracture in the young can be very unstable and often requires wire fixation or antral support, or both.

* CAPT Sazima, DC, USN is presently stationed in Vietnam and is Head of Advisory Team involved with ACTOVDENT Program described elsewhere in this issue.

Because of this review, the classic Gillies approach has been abandoned in favor of the malar hook elevation and frontozygomatic wire fixation. Also direct wiring of the inferior orbital rim affords even more stability and the advantage of exploring the orbital floor in the impure blowout fracture. For multiple fractures of the body of the zygoma and lateral borders of the maxillary antrum, antral packing has been effective and adaptable in restoration of facial contours.

The Le Fort class II and III fractures especially are best treated by the Adams wire suspension and direct fixation technics. The headcap or frame, long standard in the treatment of this type of fracture, has been replaced by direct fixation. The intact or reduced mandible is the base support and determines facial length and profile once the vertical dimension is established (by dental prosthesis, if necessary). Midface segments, especially the maxilla, can be positioned correctly. Often, midface fractures are allowed to remain impacted with the intent of enhancing bony contact, resulting in better healing without fixation by closed reduction. Correct reduction via direct visualization is simple, effective, and virtually mandatory to obviate the need for correction of the trauma's sequela, the dish face.

Mandibular Injuries

Treatment of fractures of the mandible constitutes the bulk of any facial-fracture service. The hospital dental service has at its disposal all the methods and technics that can best restore the patient to optimal functional and esthetic condition. The surgeon who is limited by using only closed or only extraoral reduction, removing all teeth, or failing to remove involved teeth in the line of fracture with only arch bar fixation is equipped to offer only limited patient care.

Our current research project, because of the frequency of mandibular fractures through the angle or third molar region, has caused us to review methods of treatment in young adult patients. Because most young adults have impacted, unerupted, or malposed mandibular third molars, this tooth is frequently involved when this region is fractured. If considerable ecchymosis or bleeding from the area distal to the second molar is present along with swelling and trismus, removal of the involved tooth is indicated. This tooth in the line of fracture acts as a foreign body and as an impediment to closed reduction and fixation. Most of the active-duty patients have almost a full complement of teeth in good repair which greatly aids treatment.

Since the unerupted tooth in the line of fracture must be removed to allow reduction, we have evolved the following technic. When post-traumatic edema and trismus subside to at least 20 mm of interincisal space, Erich-type arch bars are ligated to the maxillary and mandibular teeth with the patient under local anesthesia and sedation.

The mandibular arch bar is placed only distally to the first molar to enhance reflection of tissues from the fracture site. A modified I incision is made and the tissues are reflected sufficiently to expose the tooth and fracture for disimpaction of trapped muscle tissue. The inferior border usually can be reached on the buccal aspect. With a 20- to 30-mm opening it is difficult and unncessary to reflect lingual tissues.

Removal of the tooth usually is accomplished without difficulty because the segments can be separated. While the proximal fragment is displaced superiorly, a bur hole is made in the tooth socket or in the anterior lateral-oblique ridge. The proximal hole must be superior to the distal-fragment hole, which is placed as low as possible to prevent displacement by the elevator muscles of the mandible. Because the wire fixation after reduction is on the lateral surface to prevent medial displacement, it is effective. This maneuver requires inferior displacement of the proximal fragment that is maintained while the transosseous wire is tightened. The occlusion is checked and the fracture site is inspected again. When alignment is correct and wire placement secured, the patient can move his mandible as a unit and it will open about 5 to 10 mm more. Only two or three no. 3–0 black silk sutures are required for tissue closure. To date, postoperative hemorrhage or localized osteitis has not occurred in our series of 59 cases. The teeth are placed in elastic-traction fixation. There is increasing evidence that intermaxillary fixation in those selected cases need be maintained only for four weeks instead of the usual six weeks.

The anterior portion of the mandible can be degloved easily for similar wire placement close to the inferior border. In general, fractures in the premolar area are treated best by closed reduction. More than 30% of the fractures in our current series of 139 were bilateral. Reduction of the compound fractures to two main segments facilitates maintenance of a firm dental occlusion. Dental splints can be worn after release of intermaxillary fixation to prevent muscle distortion of the callus.

The same procedure can be accomplished with the patient under general anesthesia if trismus or patient management is a factor. With the patient under local

anesthesia, a transoral open reduction of the mandibular fracture in the third molar region can be accomplished in 1 to 1.25 hours. An extraoral open reduction for the same type of fracture requires twice the time for the intraoral and extraoral procedures.

Esthetics

Tearing and avulsion of the tissues around the mouth requires meticulous repair to reestablish the confines of the oral cavity. Alignment of the commissures and vermilion borders is the key to an esthetic result. Intraoral appliances and procedures always should be completed before closure of the oral mucosa, followed by plastic closure of the muscles and skin. Lacerations through the capsule, substance, or duct of the parotid gland which, on careful closure, still develop a facial parotid fistula can have aberrant flow of saliva diverted by oral placement of a plastic catheter for 5 to 10 days from the area of the fistula to the buccal vestibule.

Dental Infection

Fractures in the tooth-bearing regions always must be followed carefully. Teeth on both sides of the fracture should not be ligated to the splint arch bar. If the vitality of the teeth is questionable, 10 to 14 days of antibiotic therapy often are required. If radiographic evidence shows a disruption of the reparative process, the teeth should be removed. The fragments will be held relatively stable by the early callus.

Rehabilitation

Without replacement of the avulsed or damaged tissues, the delicate balance between function and esthetics cannot be restored. Tissue contours cannot be established unless the proper bony structures are symmetrical or replaced by dental prostheses. Of course, properly designed and fabricated prostheses restore the masticatory function.

Healing alone does not insure the goals of treatment. Malunion, malocclusion, and facial asymmetry all can be present with good healing. This, often, is the case for some patients who report to the naval hospital with a sequela of past facial trauma. With the trained eye, one almost immediately can see what principle was violated to cause the facial or functional sequela. What is not readily apparent are the circumstances that compromised patient care. Sometimes the deformities are grotesque, more often subtle, but the oral surgeon and prosthodontist with radiographs, study models, and photographs can evolve a plan designed to improve and return the patient to his preaccident condition.

Research

Early diagnosis and proper treatment of lateral and midfacial injuries can prevent residual defects of trauma. Facial bone defects are amenable to grafts of bone, cartilage, and occasionally alloplastics. Maxillary defects are restorable by maxillary dental prostheses.

Restoration of the continuity of the mandible has been less amenable to bone graft and alloplastic materials. Current navy research has recently shown that the osteogenic potential of cancellous iliac marrow, molded to shape by a millipore filter lining a preformed Vitallium steel crib, shows considerable promise. Bone can be grown across or on the mandible and maintain its continuity under functional stress.

Conclusion

The ultimate aim of all health care is to maintain or restore the patient to health, function, and acceptance by society. Facial and oral trauma require treatment by specialists in the hospital. Although facilities are important, equally important are the members of the staff who must keep abreast of current treatment methods, constantly review their results, and modify their technics accordingly.

The incidents and degree of facial trauma have increased gradually and sequela are sufficiently prevalent without being compounded by iatrogenic factors. Although seldom fatal, maxillofacial injuries sometimes are disfiguring and always cause varying degrees of discomfort, weeks of lost time, and great cost. The naval hospital's role in the repair of facial injuries is as important as the maintenance of health and prevention or correction of the factors of illness that lead to hospitalization.

The opinions or assertions in this paper are those of the author and are not to be construed as official or reflecting the views of the Navy Department or the Naval Service at large.

Presented at the Second Annual Symposium of the Naval Hospital, Camp Pendleton, Calif, April 26, 1969.

Research for this study was supported by the Bureau of Medicine and Surgery, Navy Department, Research Work Unit Grant no. MR005.19-6058A.

(The references may be seen in the original article.)

"TO BRING BETHESDA TO THE BATTLEFIELD"

CONFERENCES STUDY PROBLEMS OF OPERATIONAL MEDICINE

By CAPT J. H. Stover, Jr., MC, USN, Code 49, BuMed

Two conferences and an in-depth study have been devoted to the problems of operational medicine and dentistry. The aim of all has been to reduce, for all casualties, the interval between wounding and treatment in a full services medical facility. Anything less is an acknowledged degradation of medical care, even though it is obvious that we cannot airlift Bethesda to the operations area.

The Chief of Naval Operations sponsored an amphibious warfare medical seminar in Washington for three days in mid August. Representatives from a broad spectrum of operational commands, BUMED and the Systems Commands attended. The principle objectives were to review current doctrine (as delineated in the Naval Warfare Publications series), and fleet medical assets. Although much of the information that was considered, and the remedies that were prepared are classified, many items of general interest emerged.

Because of the increasing likelihood that future operations will be "Joint"—i.e., including Army and Air Force components, it was recommended that the Navy term "casualty evacuation control" be replaced by the term "medical regulating" which is used by the Army, Air Force, and Marines. Similarly, the Marine classification of evacuation priorities "Emergency, Priority, Routine, and Tactical Emergency" should be changed to "Urgent, Priority and Routine" in consonance with USA–USAF usage. The term "Tactical Emergency" was dropped simply because of its very rare employment. This category referred to the patient who, regardless of the gravity of his actual medical condition, was deterring the tactical mobility of his unit and required urgent evacuation because of this fact.

Many of the tactical publications in the NWP and NWIP series do not now reflect the impact of helicopter evacuation and were slanted toward the regulating of patients in ambulance boats. The experiences of the amphibious Ready Groups and their Special Landing Forces off Vietnam (about 70 amphibious assault landings), as well as new ships and tactics already foreseeable, require modification of these doctrinal concepts. The familiar WWII and Korea attack transports (APA'S) for instance, are rapidly disappearing from the amphibious Task Forces, and combat troops are largely transported to the area of operations in multipurpose combatant vessels such as the LPH (Amphibious Assault Ship), the LPD (Amphibious Transport Dock) and the LSD (Dock Landing Ship). Whereas the APA's had virtually no combat role after debarkation of the troops, the new ships play an active role until the landing force is firmly established ashore and may continue to play an active role even after this event. Thus, their participation as casualty receiving ships remains secondary to their combat role. The old APA'S had only minor combat missions, if any, after discharge of the troops, and provided a readily available platform for casualty reception and treatment.

A very searching analysis of the bed spaces, operating rooms, etc. available in the fleet to support contingency operations during the next decade, was conducted. Shortfalls were identified, tabulated, and recommendations for correction proposed. It was recommended that BUMED begin study of a new generation of hospital ships, that certain ship alteration proposals be submitted, and that the feasibility studies of placing modular hospital units in the LST 1179 class be expedited.

A short glossary of medical terms was approved for incorporation in NWIP 10–3 (Naval Warfare Information Publication) to avoid misunderstandings among operational planners, shipbuilders and medical personnel. It was also pointed out that although the USMC has a tactical doctrine publication for medical matters (FMFM 4–5) no corresponding manual exists in the amphibious warfare doctrinal publications. It was recommended that such a publication be prepared for the NWIP 22 series (Amphibious Warfare Doctrine publications).

It was also discovered that although certain communications doctrine for medical regulating in joint operations had evolved, no corresponding develop-

ment existed for purely Navy-Marine operations. As noted in previous articles in the Newsletter, the USMC has been actively studying this matter and in August approved certain medical networks, equipment and communications personnel allowances. Corresponding fleet action to ensure efficient regulating to afloat casualty receiving facilities was recommended, as well as appropriate revisions to tactical communications doctrine publications.

The medical implications of riverine operations, and operations with other services, were also considered.

The Bureau of Medicine and Surgery sponsored a Technical Workshop for a five-day period in late August to define the problem areas in amphibious medicine that appeared to require an R&D effort. This group included several of the individuals present at the above conference, but with the distinction that they served as technical advisors to Chief, BUMED rather than as command representatives. Six working panels considered Requirements, Professional Standards, Personnel and Training, Command and Control, Regulating and Supply. The conference was held at Airlie House, near Warrenton, Va. Initial classified briefings were conducted at the Naval Medical School. Although little time was available to enjoy the recreational facilities available, the isolation from the Washington area and the opportunity for long informal discussions were salutory. Each "point paper" was critized intensively by well qualified individuals which obviated much of the delay normally encountered by circulating papers for comment.

Seven principal areas were considered to warrant a research and development effort. It was agreed that there was a very real requirement for a systematic, carefully analytic study of total medical support to the amphibious forces by an independent group. It appeared unlikely that active duty personnel could be made available, full time, for such a study. Specific high priority areas to be considered were recommended and it was estimated that efforts would require a year to complete. Subjects to be specifically addressed are:

(a) Restructuring of type-command medical organization for amphibious operations.

(b) A study of medical logistic support to include the advantages and disadvantages of a single system of supply versus the present dual system.

(c) Methods and requirements to ensure a continuous availability of helicopters for medical purposes.

(d) Shore-based hospital requirements, both in the field, the Communications Zone and Continental U.S.

(e) USN–USMC requirements to meet the long range aeromedical evacuation responsibility when not undertaken by USAF.

(f) Primary casualty receiving ships.

(g) Economy of medical personnel.

Other major research areas recommended, by priority, were:

(a) Shipboard employment of the U.S. Army Medical Unit, Self Contained, Transportable (MUST) system.

(b) A separate study of current personnel management and training programs for medical department personnel in the Amphibious Forces and Fleet Marine Force with the object of introducing a more effective system.

(c) Evacuation by means other than helicopters (surface effect vehicles, etc.). Establishment of specifications for ambulance small craft.

(d) Shock and vibration problems in shipboard medical spaces; acceptable levels, feasibility of isolation or stabilization of critical areas.

(e) Amphibious Medical Center.

(f) Requirements for riverine operation medical support. Full study.

A third major study of related problems was completed in August. This was a USMC in-house study directed by Headquarters, USMC in response to a series of recommendations submitted to the Commandant by Chief, BUMED. These recommendations were prepared, over several years, by the Surgeon General's ADHOC Committees on Medical and Dental Support to the Fleet Marine Force. In addition, the Commandant directed that the study address dedicated aircraft for medical evacuation, Graves Registration functions, the intensive care airborne module proposal, and the Separate Surgical Company. The study was assigned to the Commanding General, Marine Corps Development and Education Center, Quantico. Participants were nominated by both BUMED and Marine Corps authorities and included medical and line personnel, principally from East Coast Marine and Amphibious activities. The study extended over a six-month period, with several plenary and subcommittee meetings at Naval Medical Field Research Laboratory under the chairmanship of CAPT J. Adams, MC, USN.

Virtually all of the recommendations made by the Surgeon General's ADHOC Committees were accepted. In addition, the group expanded the MUST requirements by recommending that the USMC procure the integrated system (less dental), rather than just the system of shelters. It was recommended that

the proposed hospital unit aboard an 1179 (Newport)-class LST should be composed of an FMF organic unit, such as one collecting and clearing company (augmented), and that this unit would actually function aboard ship until required ashore. MUST equipment was accepted for all units above battalion size and several units were recommended for Marine Air Wings.

Principal organizational changes recommended were: strengthened professional staffs in the medical battalion (Division Hospital) (additional internists, neurosurgeon, male nurses, extra GMO'S); decrease of infantry battalion medical officer personnel (to one MO per battalion instead of two); deletion of the "separate surgical company" (a 400 bed surgically oriented hospital which has never been deployed); and enlarging of the "Force Hospital Company" from 100 to 400 beds. Much of the discussion centered on the expressed desire of the FMF to become more completely supported from afloat logistics bases, including medical, rather than establishing large shore-based facilities.

Medical evacuation control was reviewed in detail and a complete system was hammered out which could serve as a standard operating procedure order. In essence, it places the major communications center and Medical Regulating Agency (patient movement control) functions at the medical battalion headquarters, with a Medical Regulating Agency Liaison Officer in the Direct Air Support Center/Helo Direction Center to furnish helo destination advice to the actual air controllers. Arrangements for onward movement of patients, determination of ultimate destinations, preparation of manifests, etc. would all be conducted by the Medical Regulating Agency and only actual passenger space and scheduling requirements would be passed to the MRA Liaison team at the Direct Air Support Center.

Medical supply problems were extensively reviewed. In general, it was felt the division medical supply distribution would be more responsive if handled by the medical battalion rather than the service organization. Other recommendations for higher level supply functions included stress on the need for trained medical supply officers.

In general, the dental company concept was deemed a satisfactory organization for the foreseeable future. However, the dental MUST components have not moved satisfactorily and field test of a two-chair facility built in a standard "SATS" military van are underway.

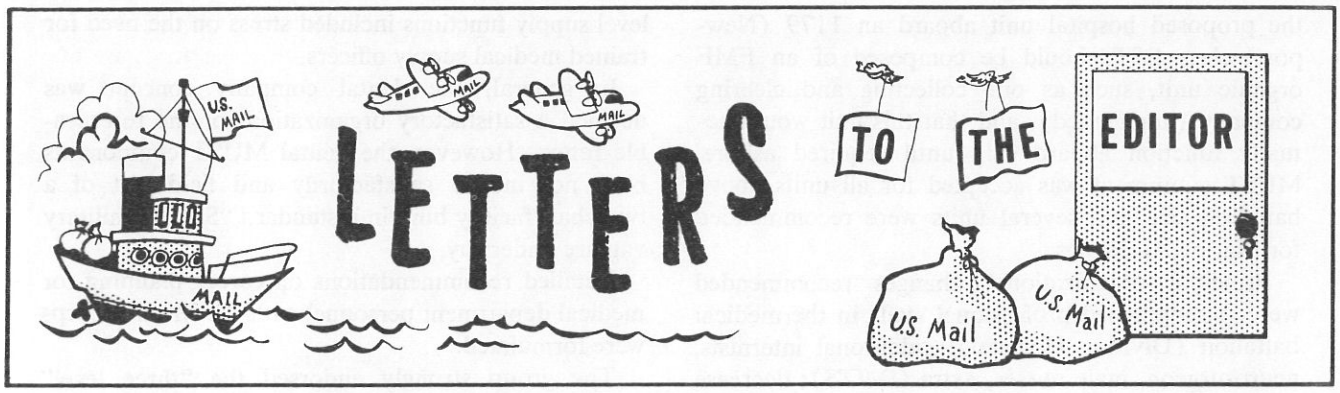
Detailed recommendations on career planning for medical department personnel with the Marine Corps were formulated.

The group strongly endorsed the "three level" concept of definitive care—i.e., emergency surgery facilities, basic hospital facilities and full service hospital facilities. Simple aggregation of emergency surgical facilities to form larger "hospital" units does not provide a "basic hospital facility". "Full service hospital" facilities would only be available in large advance base hospitals, aboard hospital ships, or in the Communications Zone or Continental U.S. and should not be part of the organic USMC medical structure.

Increased emphasis on medical matters throughout the entire system of Marine Corps schools was advocated. Specific medical indoctrination for medical officers assigned to the FMF in addition to organizational briefings, weapons familiarization, etc., was strongly recommended. This would lengthen the training cycle by a week. An alternative system of separate training for the specialists, who would be assigned only to rear area facilities, was discussed.

These three meetings were all marked by a high order of enthusiasm, cooperation and determination to improve the present medical support system for amphibious operations. The great interest shown by the participating Navy and Marine Line representatives was most encouraging to the medical personnel present. Although some of the actions recommended will require new funding programs for actual implementation, virtually all of the recommendations were for actions which could be commenced at present. Little time was spent on "pie-in-the-sky" proposals.

"Experience in the cantonments of 1917 and in the sanitation of active troops convincingly showed that war is today, as much as ever, 75 per cent an engineering and sanitary problem and a little less than 25 percent a military one. Other things being approximately equal, that army will win which has the best engineering and sanitary services. The wise general will do what the engineers and the sanitary officers let him. The only reason why this is not entirely apparent in wars is because the military minds on both sides are too superb to notice that both armies are simultaneously immobilized by the same diseases."—By Hans Zinsser in "Rats, Lice and History".



Much favorable reaction was generated by the article on dental prophylaxis at Great Lakes Naval Dental Research Institute in the August issue of Navy Medical Newsletter. The following communication, "The Challenge of Patient Education", is regarded as a fine clinical sequel to the former report.

To the Editor: Never in the history of dentistry has patient education been so challenging as it is today. Recent dental research has shed light upon the cause and prevention of dental disease, forming the basis for very specific instruction to control both caries and periodontal disease. It is well established that bacterial plaque initiates both of the diseases that cause the loss of teeth. When a patient is properly educated and given instructions for the daily removal of all plaque from his teeth, he is generally able to maintain excellent dental health. Only regular check-ups and minor repairs will be required to retain his teeth for a lifetime.

To some, the task of educating and motivating patients seems almost overwhelming, and perhaps dull. However, the dentist should accept the challenge—one patient at a time, thereby practicing dentistry at the highest level of prevention—prepathogenesis.

Although the three-agent stannous fluoride program is very helpful in reducing caries, plaque control provides the only real prevention available for periodontal disease. If we save teeth through the cariogenic age only to be lost at a later date from chronic periodontitis, we have dropped the ball.

The Navy Periodontal Disease Index and the Navy Plaque Index can provide a valuable opportunity to the astute dentist for careful observation of plaque and the resulting destruction. It can and should serve to motivate the dentist towards a greater role in preventive dentistry.

It is well known that the more serious caries and periodontal disease is found in the interproximal areas of the teeth. It is also a fact that this is an area from which the average patient fails to remove bacterial plaque. Much education is needed to correct this situation.

The use of a plaque disclosing solution prior to oral prophylaxis provides the opportunity to show the patient areas where he fails to remove plaque. Specific individual instructions may then be given to promote daily control of dental disease. The NPI score should be entered on the treatment line (section 17 of SF–603) each time it is taken so that the patient's progress can be evaluated by any dental officer who may see the patient in future visits.

During the initial instruction phase the patient's NPI should be taken and recorded at each visit. Utilizing a good disclosing solution, such as Trace (Disclosing Solution—Product of the Lorvic Corporation, St. Louis), will accomplish this task quickly and accurately with little work time lost. Work that is scheduled for the day may then be accomplished after corrective instructions are given to the patient, as needed. Any loss of work time must be weighed against the knowledge that proper patient education may well prevent future destruction requiring additional repair.

Let's all accept the challenge of passing the word to our patients. Proper education can eliminate at least 90% of all dental disease. The amount of dental work saved will repay us a hundredfold for the time devoted to instruction.

CAPT A. R. Smith, DC, USN
Dental Officer
USS L. Y. Spear (AS–36)
FPO, New York 09501

To the Editor: At times, during my brief stay in Viet Nam, I and some other members of the Navy Medical Department "on the beach" believed that the handling of casualties aboard the two hospital ships was perhaps somewhat less than maximally expeditious. The cover on the July 1970 NAVY MEDICAL NEWSLETTER, and accompanying caption, have at last explained why. I didn't know until now that the litter bearers aboard ship always walked backwards.

CAPT J. V. Brown, MC, USN
Naval Hospital
Great Lakes, Ill. 60088

After enjoying a chuckle afforded by CAPT Brown's comment, we hasten to defend the integrity of the SANCTUARY photograph. While at first glance it may appear that a patient is already placed on the stretcher (background interference), such is not the case. Careful scrutiny of a blown-up photograph further reveals that what may suggest the arm of a patient hanging over the side of the stretcher, is in fact a fortuitous piece of linen superimposed on the rear leg of the stretcher. (Pointer lines indicate the front and rear legs of stretcher). The caption for our July cover photo was therefore correct, since approaching litter-bearers were truly "preparing to transfer a patient from a helicopter to the hospital's receiving room." You're a good man, PH3 Dennis McCloskey, and a fine photographer.

Notes and Announcements

The **Navy's Enlisted Nursing Education Program (NENEP)** offers hospital corpsmen and dental technicians an opportunity to earn baccalaureate degrees in nursing with full tuition, fees and books provided by the Navy. Students receive pay and allowances and are eligible for advancement while in school. Graduates are commissioned Ensigns in the Nurse Corps Naval Reserve. On August 5 a selection board picked the following 31 enlisted men and women for NENEP: HM3 Cecil M. Amick; HM2 William M. Barnes; HM2 Trumin P. Brown; HM3 William E. Brown; HM3 Michael J. Burnside; DT2 Ronald E. Butcher; HM2 William D. Crichton; HM3 Michael F. Dowdell; HM3 Donald A. Floyd; HM2 Victoria A. Gehauf; HM3 Ellis J. Hoover; HM2 Edward G. Hoope; HM1 Dale L. Klos; HN Douglas K. Leiby; HM3 Kent P. Leslie; HM2 Virgil H. Lewis; HM3 Alexander C. Loveless; HM2 Arnold E. Mattis; HM3 Kenneth R. McClinton; HM1 John S. Mott; HM2 Charles B. Mount; HM2 Robert P. Owen; HM1 William H. Palmer, Jr.; HM2 Linda A. Pearson; HM2 William J. Peterson, Jr.; HM3 Larry L. Plunkard; HM3 Laurance K. Poole; HM2 George H. Schroeder; HM2 Billy E. Tarbox; HM1 Stephen M. Vasek; HM1 Paul D. Wentland.

During the past three years the Bureau of Medicine and Surgery and the Medical Service Corps have been making a systematic review of the Corps' overall training requirements and evaluating the programs available to acquire the skills and knowledge necessary to fulfill these requirements. Under contract with BuMed, the American Institutes for Research (A.I.R.) has been conducting a study of the specific needs of the Medical Service Corps as a part of this larger effort. Hundreds of MSC officers were interviewed throughout the U.S. A comprehensive summary of the job and training requirements and evaluation of the extent to which these requirements were currently being met were made. It was concluded that present programs which focus around the **Naval School of Health Care Administration** were extremely effective, but a need to provide opportunities for advance management activities for the more experienced MSC officer was recognized. MC and NC officers were asked to participate so that various points of view concerning Medical Department administration could be discussed. Twenty-three experienced MSC, MC and NC officers participated in a three and one-half day **Experimental Health Care Administration Seminar** at the Naval School of Health Care Administration, developing management Action Catalogues of alternative procedures which will be attempted at their local duty stations to solve an important problem. (Forces that prohibited or promoted solution of the problem had been identified at the Seminar.) The research staff has made field visits to each of the Medical Department facilities represented in order to assist participants in implementing their solutions and ideas developed at the July Seminar. A follow-up Seminar in September, attended by the same participants, was scheduled to determine whether or not a permanent program of this type would benefit the Navy MSC.

Revisions in DoD policy on drug abuse have been recommended by a task group headed by Vice Admiral William P. Mack, USN, Deputy Assistant Secretary of Defense (Manpower and Reserve Affairs). A statement of the study was presented Aug. 20 by ADM Mack to the Subcommittee to Investigate Juvenile Delinquency of the Committee on the Judiciary, U.S. Senate. It was noted that the extent of drug abuse in the Armed Services is not precisely known,

but is probably no more widespread than in the civilian population. While an alarming increase of cases investigated in Vietnam, CONUS and worldwide is recognized, military readiness is not considered to be endangered at this point. The real impact is the possibility of permanent damage to the minds and bodies of the thousands of young men who are using narcotics and dangerous drugs worldwide, and who are using strong, dangerous varieties of marijuana and hard narcotics which are available worldwide and particularly in and near the Republic of Vietnam. Among the conclusions of the Task Group were the following items: every effort to keep past or potential drug addicts, suppliers, or users from entering the Armed Services should be made; a universal educational effort should be expanded beyond past and present programs to cover all members of the Armed Forces including the Reserve Forces, DoD employees, and dependents at all periods of their lives and careers; where education fails the abusers should be dealt with quickly, firmly and fairly, but with enlightened methods that assure that the best interests of the Government and the individuals are served; where discipline fails, every reasonable effort within available resources should be made to rehabilitate those who might be of further use to the Armed Services. . . . more serious cases should be considered for sufficient rehabilitation to permit them to re-enter society . . . a balance between the best interests of the Government and the individual must be reached; where rehabilitation within the Services' facilities is not possible, liaison with the VA and state and local agencies must assure that those discharged as needing further treatment and rehabilitation are guided to those agencies; the discharge system now in effect in the Armed Forces represents a fair and proper method of categorizing service. . . . changes in it should not be made for the sole reason of allowing drug abusers to receive Veterans benefits. . . . changes in basic law should be sought to provide a solution to this problem; research should continue in the Armed Forces and in all agencies of the Federal Government at a rapid pace in all areas of drug abuse and in manpower techniques to permit us to improve the screening, education, discipline, and rehabilitation of personnel and to allow faster, more positive detection and identification of narcotics and dangerous drugs. In general, the Task Group recommendations strengthen and support policies already promulgated and in some cases instituted in various areas of the world on a trial basis. For example, an individual would not necessarily be precluded from serving his country if he has experimented with some of the dangerous drugs. The report states in Recommendation 11 as follows: "It should be the policy of the Department of Defense that acceptance into military service be based on the 'whole man' concept. Each registrant or applicant with a background of drug abuse should be carefully processed to determine the individual's physical and emotional capacity for useful military service. Enlistment and induction standards, including the granting of waivers thereto, should be established by each Service."

Military hospitals are authorized to perform abortions without regard to state or local laws as part of the **Defense Department's family planning program.** Pregnancies may be terminated in military medical facilities when medically indicated or for reasons involving mental health. Earlier this year, DoD spelled out surgical sterilization procedures saying such operations may be performed on eligible persons in military facilities in accordance with sound medical practice. Both abortion and sterilization operations are subject to the availability of space and facilities, and the capabilities of the medical staff. "Neither state laws nor local medical practices will be a factor in making these determinations," said Dr. Rousselot, Assistant Secretary of Defense (Health and Environment). In countries where the U.S. has negotiated a status of forces agreement, DoD has ruled that family planning procedures in military facilities should be limited to military and civilian personnel in the Defense Department and their dependents. The rulings do not include the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS), which covers all recognized forms of family planning procedures "so long as they are not performed in violation of applicable state law," it was noted. A DoD directive issued in 1966 established a family planning service for the military. Watch for a new Instruction which will be forthcoming. Any physician who considers the performance of such procedures morally or ethically wrong shall not be required to perform them. The legal and moral rights of spouses and/or parents must be evaluated in each applicable case of contemplated sterilization or abortion.

It is essential that pregnancy tests be made available early to the inquiring female, especially in these times of liberalization in the surgical termination of pregnancy. Those who converse with patients in the out-patient departments must distinguish between **requests for pregnancy tests** and requests for prenatal appointments. Confusion has arisen when the patients desiring pregnancy tests were told that their appointments would be scheduled in the prenatal clinic two or three months after missing the first pe-

riod. At some activities patients were told that they could obtain pregnancy tests about 40 days following the last period. The problem in communication should be reviewed in your activity in order to correct any such misunderstandings.

It is implied in some recent literature that detection of the **Australian antigen** will negate the risk of infectious hepatitis associated with blood transfusions. The American Association of Blood Banks has expressed reservations concerning the procedure at this time: "It is still necessary that a standard reagent be developed, that it be approved by the Division of Biologic Standards and that it be available in adequate supply. Until such a service of uniform control potency is developed and approved, such testing must be regarded as experimental and primarily for purposes of research." Testing for Australia antigen as a donor screening test continues to show exciting promise. However, the same problems which were described in the National Research Council statement continue to exist, so that such testing cannot reasonably be performed routinely.

CDR Katherine A. Howard, NC, USN of Grand Rapids, Mich., relieved **CDR Katherine Wilson, NC, USN** as Chief, Nurse Corps Training Division and **Director, Navy Nurses Anesthesia Training Program** at the National Naval Medical Center, Bethesda, Md. A graduate of Blodgett Memorial Hospital School of Nursing in Grand Rapids, CDR Howard received her certificate in Nurse Anesthesia at the University of Michigan in Ann Arbor. In 1963, CDR Howard served as the Clinical Instructor of the First Navy Nurse Anesthetist Training Program in Great Lakes, Ill. The Anesthesia Program is a 24-month program of education in Anesthesia which prepares Navy NC Officers for certification as Anesthetists by the American Association of Nurse Anesthetists. The students' first year is spent at the George Washington University and the Naval Medical School, NNMC, Bethesda, Md. Following the completion of their first year of training at Bethesda, the future anesthetists are transferred to either Portsmouth, Va. or Great Lakes, Ill. for the final 12 months of training at naval hospitals. The Candidate Program for Nurse Anesthetists, another facet of the program, offers a commission as Ensign, Navy Nurse Corps, to civilian nurses who are in their final six months of Anesthesia training.

National approval of a unique military-civilian **joint residency training program for surgeons** at Memorial Hospital of Long Beach and the Naval Hospital in Long Beach, Calif. has been announced. The non-profit Memorial Community Medical Center and the Navy have joined forces to present a four-year, post-internship training program for two surgical residents a year. Approval of the program came from the Conference Committee on Graduate Education in Surgery representing the Council on Medical Education, the American Board of Surgery and the American College of Surgeons.

MAJ Paul W. Schilling, USAF, Veterinary Service Division, Naval Medical Research Institute, NNMC, Bethesda, Md., has recently been **certified as a diplomate by the American College of Laboratory Animal Medicine.** A specialty of Veterinary Medicine, Laboratory Animal Medicine deals with the treatment and prevention of disease in animals used as subjects in biomedical research. Eligibility for certification as a specialist includes the completion of training and experience requirements by the individual, demonstration of research capabilities, and successful completion of comprehensive written, practical and oral examinations administered by the College.

CDR Kenneth W. Sell, MC, USN, has departed for USSR as a member of a six-man delegation for the purpose of exchanging scientific information on organ transplantation, transplantation immunology and other related subjects. The group will lecture in seminars on subjects ranging from organ transplantation surgery to organ banking, tissue typing and immunosuppression. Following a tour of medical institutes in Moscow, Leningrad and Rostov-on-Don, CDR Sell will deliver a lecture at the Third International Congress of the Transplantation Society, The Hague, Netherlands. Dr. Sell has served as the Head of the Experimental Immunology Division and the Tissue Bank of the Naval Medical Research Institute at NNMC, Bethesda, Md., since 1965. He received a Doctorate in Immunology at the University of Cambridge, England. Other members of the delegation are: Dr. Bernard Amos, Professor of Immunology at Duke University Medical School, Delegation Chairman; Dr. Donald Kayhoe, Head of the Transplantation and Immunology Branch of the National Institutes of Allergy and Infectious Diseases; Dr. Fritz Bach, Department of Medical Genetics, University of Wisconsin; Dr. Sam Kountz, Professor of Transplantation Surgery, University of California at San Francisco; and Dr. Roger Rossen of Baylor University, Houston, Texas.

Repeat **Executive Development Seminar** is slated for 26–28 Oct. Attendance will be limited to officers of the rank of LCDR or above and civilian employees of the grade of GS–12 or above, selected for attendance at the seminar presented by the Naval School of Health Care Administration, NNMC, Be-

thesda, Md. A previous Executive Development Seminar during June 1970 stimulated interest among senior managers at NNMC in improving their management practices. Current trends and historic evolutions concerned with management were examined and made relevant to daily work situations of the participants.

CAPT Solomon C. Pflag, MSC, USN, formerly Director of Technical Operations, Medical Directorate, Defense Personnel Support Center, has assumed the office of **Chief Field Branch, Bureau of Medicine and Surgery and Director of the Materiel Division.** The Field Branch, a separate Navy unit and command, is located at 3500 South Broad Street, Philadelphia, Pa.

The Field Branch is the principal Bureau of Medicine and Surgery agency responsible for medical material support to the operating forces, hospitals and dispensaries not under Bureau of Medicine and Surgery command. Among its functions are the outfitting of fleet units and peacetime and mobilization special programs. It also functions as the Materiel Division of the Bureau of Medicine and Surgery. The magnitude of this responsibility is such that it encompasses the material requirements of approximately 800 ships and 1,400 shore activities to which medical personnel are attached.

Captain Pflag resides in Cherry Hill, New Jersey.

BETHESDA CORPSMAN COMPETES AT FOREST HILLS

What does HM3 Robert Salembier of Bethesda do when he's not looking through the microscope at his job as microbiologist? He either plays the organ, his guitar, his recorder (or one of several other instruments)—or he plays tennis.

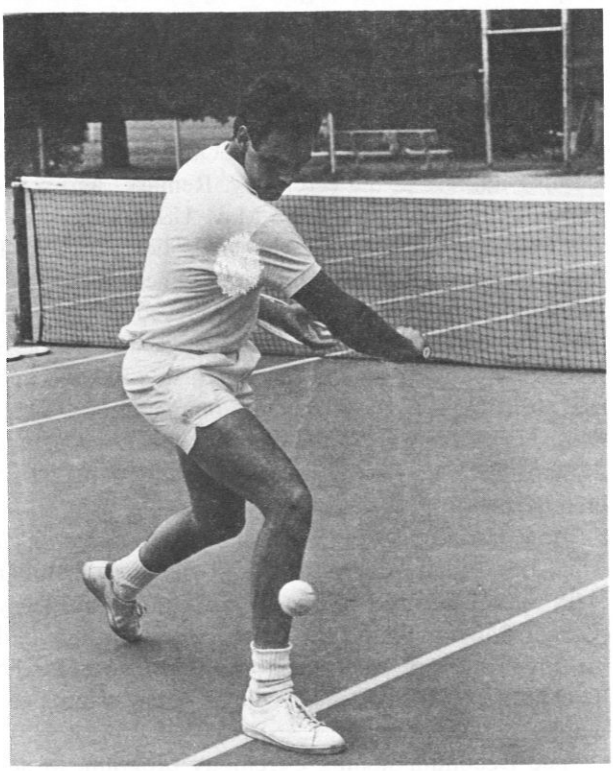
It was tennis this September wnen he teamed up with Patty Saint-Ann Hogan, the 5th-ranked girl player in the U.S.; they played mixed doubles at Forest Hills, New York.

Salembier also applied to participate in the singles tournament at Forest Hills. In addition to playing, he was invited to serve as assistant to the Referee as he did last year.

He recently returned from Wembleton where he served as an umpire at the Lawn Tennis Championship of Great Britain. It was Salembier's first year there but he was given a chair. He was further honored by being elected to the British Lawn Tennis Association Umpire's Association. He is one of the few Americans to be elected to this body.

HM3 Salembier played for the University of Pittsburgh for four years until 1968 when he graduated with degrees in Microbiology and Music.

Following graduation Petty Officer Salembier joined the Naval Reserve. He was recently called to active duty and was assigned as a Hospital Corpsman in the Microbiology Department of the Naval Medical Research Institute, NNMC, Bethesda, Md.



—PAO, NNMC, Bethesda.

USS REPOSE (AH–16) DECOMMISSIONED

At 0900 hours on August 15, 1970, USS Repose commenced her decommissioning ceremony. The decommissioning ceremony marks the retirement of a ship as a unit of the operating forces of the U.S. Navy. At the moment of lowering the commission pennant, USS Repose was no longer the responsibility of the Commanding Officer who, together with the ship's officers and men, had the responsibility of making and keeping her ready for any mission required by our Nation in peace or war.

The commission pennant is believed to date from the 17th century when the Dutch were at war with the English. The Dutch Admiral Maarten Harpertszom Tramp hoisted a broom at his masthead to indicate his intention to sweep the English from the sea. This gesture was answered by the English Admiral, who hoisted a horsewhip, indicating his intention to subdue the Dutch. The English were victorious, and ever since, the narrow "coachwhip" pennant has been adopted by all nations to distinguish a ship in the service of the government.

The U.S. Navy commission pennant for a hospital ship is the Red Cross flag as compared to a man-of-war ship pennant, which is blue at the hoist with a union of seven white stars and a horizontal red and white stripe at the fly.

CAPT C. E. Kee, MC, USN, Commanding Officer of U.S. Naval Hospital in REPOSE gave the welcoming address at the ceremony. Remarks and reading of orders by CDR P. E. May, USN, Commanding Officer, USS Repose (AH–16) followed. (CAPT R. F. Menge, USN, Commanding Officer during the Vietnam tour 1969–1970, was relieved of duty on July 15, 1970.) After the hauling down of colors and commission pennant, the watch was secured and the ship was presented to the Commanding Officer, U.S. Naval Station, Long Beach, Calif. Acceptance by CAPT C. E. Stastny was followed by benediction and departure of the official party.

As is traditional at the decommissioning of a naval ship, the ensign was presented to the crew member with the longest service on board, Senior Chief Petty Officer Phoenix, USN; the union jack was presented to the youngest crew member, SA Gardner; the Commanding Officer received the commission pennant.

The Decommissioning Ceremony program, in addition to the above information, provided the following brief history of REPOSE in Vietnam:

"The U.S. Navy Hospital Ship REPOSE sailed for Vietnam on January 3, 1966, after a one-hundred and fifty day activation period completed at Hunters Point, Naval Shipyard. After completing refresher training at Pearl Harbor, REPOSE arrived off the coast of Chu Lai on February 16, 1966 to support Allied Forces in the I Corps Area. During her first year she participated in the following operations: Double Eagle, Utah, Hasting, Colorado.

In 1967 REPOSE provided support in the Chu Lai, Dong Ha, Phu Bai, and DaNang areas. During the year she participated in operations Prairie II, Beacon Hill, Bear Charger, Hickory and Bear Bite. In mid-August, REPOSE was presented her first Navy Unit Commendation. The award cited REPOSE's role in several Marine Corps Operations near the Demilitarized Zone in Vietnam, the number of patients treated and the record number of accident-free helo landings.

During her third year in Vietnam, REPOSE operated in the Northern I Corps Area, where there was heavy fighting along the Demilitarized Zone and in the A Shau Valley in March and again in May. During the month of May, REPOSE set a one month admittance record of 953.

During her fourth year, REPOSE continued to operate in the Northern I Corps Area, between DaNang and Wunder Beach. Although the character of fighting had changed, no significant reduction in the number of patients received occurred until after November 1969. Outpatient admissions rose significantly during her third and fourth years.

On January 17, 1970, REPOSE was presented her second Navy Unit Commendation. The award again cited REPOSE's patient care and her record number of accident-free helo landings.

REPOSE departed DaNang for the last time on 14 March 1970. On her way home she made goodwill stops in Subic Bay, Hong Kong, Kobe, Yokosuka and Pearl Harbor before returning to her former homeport of Alameda on 30 April 1970, having spent more than four years in Vietnamese waters.

During her tour in Vietnam, REPOSE provided medical services not only for American service and civilian personnel but also treated Vietnamese civilians and military, Thai, Filipino, Chinese, Korean and French. From February 1966 when REPOSE arrived in Vietnam until her departure in March, 1970, more than 24,000 patients were admitted for in-patient care. Of this number more than 9,000 were battle casualties. In addition 37,000 out-patients were seen and treated."

ACTOVDENT—ACCELERATED TURNOVER TO THE VIETNAMESE—DENTAL

By CDR W. G. Reed, DC, USN, Force Dental Officer, Commander Naval Forces Vietnam

The Vietnamization effort in dentistry not only involves the turnover of dispensaries and the establishment of new facilities but of even greater importance, an extensive advisory and training program for Vietnamese dental personnel.

Vietnamese specialty treatment capability is vital if thousands of military and civilian patients are to be returned to normal life. Our Navy's effort in this field is just beginning and results cannot be measured in weeks or months, but years. A weak or curtailed effort at this point would prove to be disastrous for the Vietnamese men, women and children who are so desperately in need of compassion and help.

A strong dental advisory effort is considered by the Bureau of Medicine and Surgery and Commander Naval Forces Vietnam, as having great potential in the overall ACTOV program and is being given a top priority for development.

The retrograde of Naval Support Activity DaNang hospital and dental department will provide most of the immediate personnel and equipment resources to implement an impressive ACTOVDENT program this year. Personnel efforts will be concentrated on the surgical and prosthetic repair and reconstruction of war-induced maxillofacial injuries. Dental assisting, preventive dentistry and equipment maintenance and repair training programs will be concurrently developed by the advisory team.

Primary targets for the advisory effort and equipment support will be nine Vietnamese Navy ACTOVDENT sites plus other areas of opportunity, such as the Republic of Vietnam Armed Forces (Cong Hoa) Hospital, University of Saigon Medical and Dental School, and Ministry of Health Hospitals.

To the best of my knowledge, the full time assignment of a dental advisory team is a "first" in the Vietnamization program and the effort is attracting considerable attention.

The advisory team, headed by CAPT H. J. Sazima, DC, USN, will consist of a maxillofacial surgeon, maxillofacial prosthetist, prosthodontist, and dental technicians specifically trained in these fields. A general dentist and technicians will supervise the dental assisting and preventive dentistry programs. Two repair technicians will develop formal and on-the-job training instruction.

The U.S. Navy Dental Corps is in a unique position to provide a lasting contribution, not only to the Vietnamese Navy and Republic of Vietnam Armed Forces dental services, but to the dental health and welfare of the Vietnamese people.

Our overall goal is to provide, through the spirit of inter-service and international cooperation, a highly trained nucleus of Vietnamese dental officers and technicians who will carry on the initial effort of the Navy dental advisors through a concept of "teaching the teachers".

FROM THE MC DETAILER

1. Due to the overall reduction in Navy strength, BUPERS directives have resulted in an involuntary early separation for a number of medical officers. A question in the minds of many of those so selected is whether they become susceptible to the draft if they have not completed two full years of active duty. The answer is no! The law now states that those who are separated after completing one year of active duty are deemed to have fulfilled their selective service obligation. Thus they are not subject to recall except in the case of a declared national emergency. Even those reservists who have served two years would be obligated under such a declared state.

2. Concomitant with the above, any reservist who contemplates extending his active duty time or who is considering integration into the regular Navy, should make his desires known well in advance to preclude possible early involuntary separation. Extensions for a period of no less than one year will receive favorable consideration by BUMED.

3. Navy Interns are reminded that a special duty preference form will be distributed to them by their intern advisor in the Fall. All questions prior to this should be addressed to the intern advisor. An advisory team from BUMED will also visit each training hospital in the Fall to discuss assignments, training and related matters. Correspondence or phone calls received by the Bureau prior to submission of the preference forms, is considered to be premature.—Code 3171, BuMed.

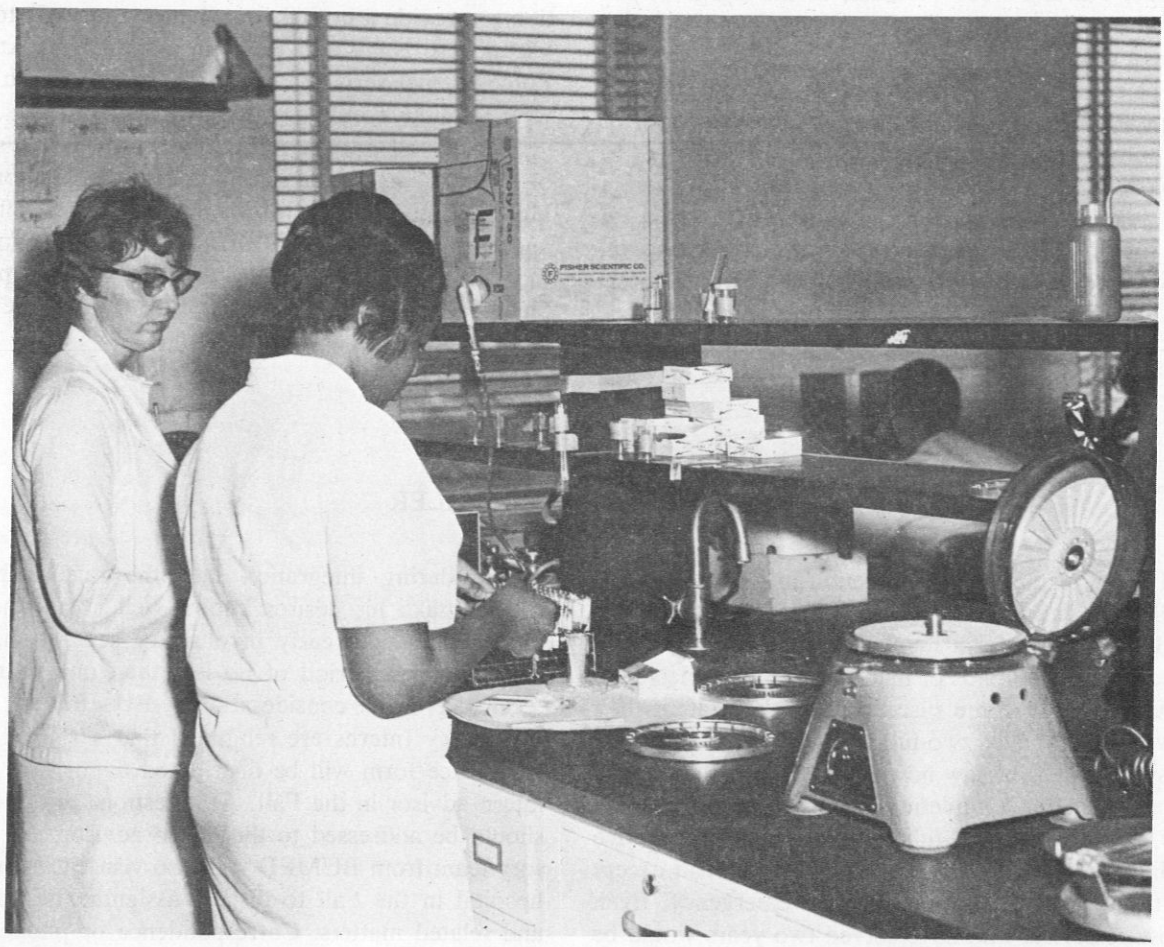
RADM YON CITED FOR SOCIAL ACTION PROGRAM

A naval officer who instituted a number of off-duty, skill-oriented job programs for the civilian employees at the Naval Hospital in Portsmouth, Va., has been awarded the Legion of Merit.

RADM Joseph L. Yon, Commanding Officer of the hospital and Medical Officer for the Fifth Naval District, with headquarters in Norfolk, Va., was presented the Legion of Merit by Undersecretary of the Navy John Warner during ceremonies conducted at the Pentagon on August 25, 1970.

The admiral started implementing his programs at the naval hospital in January 1966, enabling its civilian employees to increase their education, training, and chances of promotion in their jobs, and offered Tidewater area disadvantaged young men and women jobs at the hospital.

As a result of the programs begun by Admiral Yon, this summer 56 youths from the Portsmouth area were enrolled in the Neighborhood Youth Program, 35 high school dropouts have enrolled in the Job Corps, and ten young people have been employed by the Naval Hospital from Norfolk's Model Cities area.



A career development program for ward attendants, leading to positions as Nursing Assistants, was one of the many programs instituted by RADM Joseph L. Yon, Commanding Officer of the Naval Hospital, Portsmouth, Va., in his support of the Department of Defense Human Goals Program.

Undersecretary of the Navy John Warner (left) congratulates RADM Joseph L. Yon after presenting him with the Legion of Merit for exercising outstanding leadership and professional competence in fostering the human goals principles of the Department of Defense. RADM Yon's wife, Mrs. Sallie P. Yon, was a special guest at the ceremony.

The Portsmouth facility is the Navy's second largest hospital.

"Rear Admiral Yon gave unsparingly of his time in improving the stature of the less fortunate, and his profound understanding for the underprivileged is evidenced by continued cooperation with federal and local social welfare agencies," the citation reads. "His keen perception in recognizing individual needs, aspirations, and capabilities has resulted in transforming potential talent into meaningful production."

Graduating from the Virginia Military Institute, Admiral Yon received his M.D. degree from the University of Virginia School of Medicine in 1937. He was commissioned into the Navy Medical Corps in 1938, and rose to his present rank in 1964.

ENVIRONMENTAL HEALTH CENTER

The Navy Ordnance Environmental Health Center, formerly at Crane, Indiana, has been relocated in Cincinnati, Ohio. The move was made to obtain better coordination with Public Health Service and other Occupational Health Agencies, including the University of Cincinnati and the Kettering Laboratories. In its new location, fully operable 1 July, better communication and transportation facilities are now available.

PHARMACY TECHNICIAN, USN

By CDR Ralph D. Chansky, MSC, USN, Naval Hospital, Portsmouth, Va.

The training of Pharmacy Technicians within the Department of the Navy is an integral part of the many-faceted education and training program within today's modern Navy.

The training of hospital corpsmen in Pharmacy Technic, as well as in other medical and dental specialties, is conducted under the auspices of the Bureau of Medicine and Surgery, Department of the Navy.

Historical Background

Formal courses of instruction in Pharmacy Technic, conducted by the Medical Department of the Navy can be traced back more than 35 years. These long and illustrious years of training commenced in the year 1934, at the Navy Medical School, then located where the Bureau of Medicine and Surgery stands today. The first class, composed of seven enlisted hospital corpsmen, was graduated in April of 1935 and represented the first group of formally trained Pharmacy Technicians. Pharmacy training moved to the newly established medical facility, National Navy Medical Center, Bethesda, Md. in 1942. In 1956, The Pharmacy School moved again to its present location at the Naval Hospital, Portsmouth, Va. A sister school was later established and is located at the Naval Hospital Corps School in San Diego, Calif.

Curriculum

Today's Pharmacy student studies under a curriculum which bears little resemblance to that of 35 years ago. This is understandable when one considers that the introduction of a myriad number of new drug entities into the Pharmacy-Medical armamentarium and the technological advances during the past 35 years have had great impact and have greatly increased the intelligence required of a Pharmacy Technician. While certain core areas of pharmaceutical instruction and related disciplines have not been significantly effected by these changes, others have felt the impact more directly. Comparison of the required curriculum hours of didactic and practical instruction in 1946 (Table 1) with the curriculum in use today (Table 2), provides ample evidence of such impact.

As expected, the most significant change has occurred within the subject area of "Materia Medica and Toxicology", currently entitled "Pharmacology and Toxicology." It should be noted that this subject was allotted 50 hours or 5% of the total hours in the 1946 curriculum and has recently been expanded to a total of 288 hours or 24% of the total training hours.

Table I
Curriculum—1946

Subject	Didactic Hours	Practical Hours	Total
Pharmaceutical Arithmetic	40	0	40
Pharmacy	108	473	581
Chemistry	80	243	323
Materia Medica and Toxicology	50	0	50
Grand Total	278	716	994

Table 2
Curriculum—Current

Subject	Didactic Hours	Practical Hours	Total Hours
Principles of Pharmacy	128	0	128
Compounding and Dispensing	0	256	256
Pharmaceutical Math	140	0	140
Pharmacology and Toxicology	288	0	288
Inorganic Chemistry	96	0	96
Organic Chemistry	96	0	96
Pharmaceutical Chemistry	96	0	96
Pharmacy Administration	20	0	20
Military Requirements	0	80	80
Grand Total	864	336	1200

Training

Each Pharmacy trainee ordered to the Pharmacy Technic School (C) for a comprehensive and accelerated 32-week course of instruction in Pharmacy Technic is issued the most recent editions of official and non-official texts in the field of Pharmacy and related disciplines. In the main, a Pharmacy trainee will not receive instruction from service-prepared publications but will utilize specifically selected texts comparable to those that are utilized in civilian colleges of Pharmacy. The 256 hours of practical experience, which each student receives as part of the official curriculum, are conducted in specially designed modern laboratories permitting assignment of each trainee to a specified work area. To augment this practical aspect of the Pharmacy training program, each student is rotated through various departments of the very active Pharmacy at the Naval Hospital, Portsmouth, Va. Under the direction of the Chief of the Pharmacy Service, students are permitted to actively participate in tasks being performed. Upon satisfactory completion of the 32-weeks' training period, trainees are certified by the Bureau of Medicine and Surgery as Pharmacy Technicians (8482). They are normally assigned next to hospitals or large dispensaries where additional training and actual practice of those skills learned during the training period may be further refined and polished under the watchful eye of a Navy Pharmacist.

Comment

Additional information regarding the Pharmacy Technic School, detailed information on each curriculum area, and information to assist qualified and interested personnel in applying for acceptance may be found in BuMedInst 1510 series or by direct correspondence with the Pharmacy Training Officer, Enlisted Training Service, Naval Hospital, Portsmouth, Va. 23708.

SF 522 CONSENT FORM

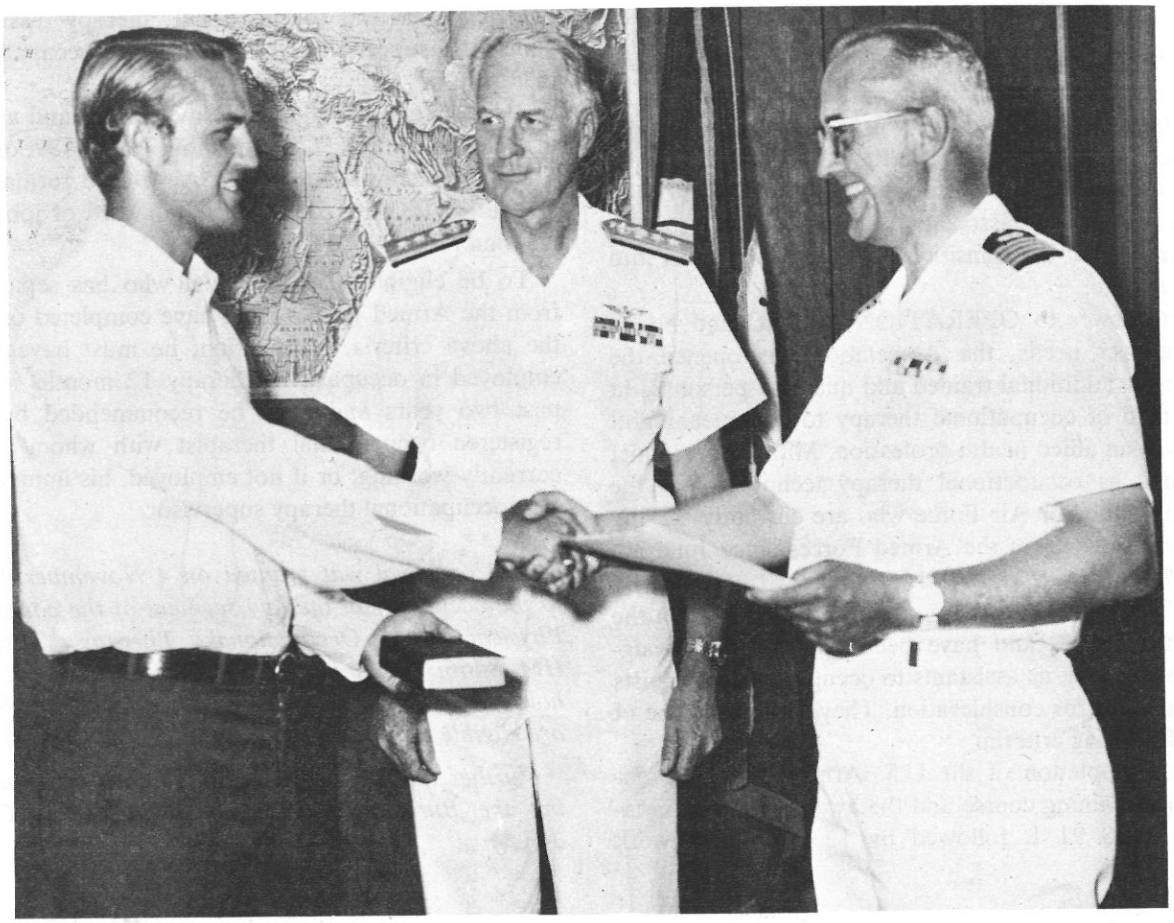
NAVMED 6320/6, Anesthesia and Surgical Procedures Information Checklist has been cancelled. While a revision of SF 522 is presently under study, SF 522, Authorization for Administration of Anesthesia and for Performance of Operations and Other Procedures, shall be used as the anesthesia and surgical procedures consent form for active duty personnel. SF 522 shall continue to be used for dependents, veterans, or other nonactive duty military personnel. (BuMed Notice 6320.)

MEDICAL STUDENTS COMMISSIONED IN NAVY'S NEW SCHOLARSHIP PROGRAM

One of the first students to qualify for the Navy's new medical and osteopathic school scholarship program recently received his commission as a naval officer. Warren L. Boughton, a sophomore medical student at George Washington University, was sworn into the Navy by his father, retired Chief Warrant Officer Willie J. Boughton, in ceremonies held at the Washington, D.C. Navy Recruiting Office. The new Ensign will continue his medical studies this fall at the University under Navy sponsorship and, upon graduation, will serve as an officer in the Medical Corps.

Robert B. Daggett was also sworn into the Navy Medical Corps Reserve by his father, CAPT R. E. Daggett, CEC, USN at NAS, Quonset Point, R.I.

Warren L. Boughton is sworn into the Navy by his father, retired Chief Warrant Officer W. J. Boughton of Riverdale, Md.



CAPT R. E. Daggett congratulates his son upon being sworn into the Navy Medical Corps Reserve. RADM Joseph B. Tibbets, Commander Fleet Air Quonset witnessed the swearing in ceremony. Left to Right: Robert B. Dagget; RADM Joseph B. Tibbets, USN, Commander Fleet Air Quonset Point, R.I.; CAPT R. E. Daggett, CEC, USN, Public Works Officer, NAS, Quonset Point, R.I.

A hundred candidates were recently selected for participation in the new scholarship program. The continuing program offers complete scholarship assistance and the pay of a naval officer to selected candidates. Applicants must be accepted to an approved school of medicine or osteopathy before applying for the program and must meet the standards for commissioning in the naval service. Interested personnel may contact the Medical Corps Procurement Branch at the Bureau of Medicine and Surgery in Washington, D.C. for additional information. A number of scholarships will be offered by the Navy each year. —PAO, BuMed.

ERRATUM

In the July 1970 issue of Navy Medical Newsletter, an error was made in reproducing CDR Roling's article entitled "Intramural Hematoma of the Intestine". Figures 3 and 4 on page 25 were inadvertantly reversed. The typical "picket-fence" appearance on the 11th hospital day is clearly seen in the illustration on the right, while the improved study conducted one month after admission is reflected by the illustration on the left.

CERTIFIED O–T ASSISTANTS

The American Occupational Therapy Association has adopted the policy to consider the eligibility of military personnel, trained in occupational therapy duties, for certification with the Association as Certified Occupational Therapy Assistants. It is one of the first professional associations to establish a program to implement the transition of military personnel into civilian life.

In answer to OPERATION MEDIC and health manpower needs, the Association has opened the door for additional trained and qualified personnel in the field of occupational therapy to find meaningful jobs in an allied health profession. Military personnel trained as occupational therapy technicians in the Army, Navy or Air Force who are currently serving or separated from the Armed Forces since June 30, 1962 are eligible under this program.

Those individuals who are currently serving in the Armed Forces and have been qualified and designated to work as assistants to occupational therapists are eligible for consideration. They must meet one of the following criteria:

1. Completion of the U.S. Army formalized on-the-job training course and the award of job designation MOS 91 L followed by 12 months of work experience as an occupational therapy assistant under the supervision of a registered occupational therapist, or

2. Completion of the U.S. Navy course and award of the Navy Enlisted Classification, HM–8487, or

3. Completion of the U.S. Air Force formalized on-the-job training course and the award of job designation AFSC 91351.

To be eligible, the individual who has separated from the Armed Forces must have completed one of the above criteria. In addition, he must have been employed in occupational therapy 12 months in the past two years and must be recommended by the registered occupational therapist with whom he is currently working; or if not employed, his immediate past occupational therapy supervisor.

Full approval was granted on 4 November 1969 to the occupational therapy segment of the course in Physical and Occupational Therapy Technic HM–8466. Beginning with Class 6901, graduates holding the Navy Enlisted Classification HM–8466 are eligible to apply for certification.

Further information may be obtained by contacting the Bureau of Medicine and Surgery (Code 34).

✝ In Memoriam ✝

CAPT Ronald N. Grant, MC, USN, Retired, died on August 24, 1970 when he collapsed with a probable heart attack on a bus in New York City. He was born in Milwaukee, Wis., on April 14, 1912. Dr. Grant was a graduate of Harvard University Medical School and commenced active duty in the Navy in 1938. Among many active duty assignments, he served as Medical Corps Detail Officer in BUMED in 1944–45. Following retirement in May 1959, Dr. Grant was an associate in surgery at Bellevue Hospital and Associate Professor of Clinical Surgery at NYU School of Medicine. At the time of his death he was Vice President in charge of professional education for the American Cancer Society.

CDR Lorraine M. Murphy, NC, USN, died of cardiac arrest at Boston University Hospital, Boston, Mass., on July 29, 1970. Born in Boston, Mass. on May 9, 1926, CDR Murphy graduated from Carney Hospital School of Nursing in 1947. She received the Bachelor of Science Degree in Nursing from Boston University in 1961 and was graduated from the Naval Postgraduate School, Monterey, Calif. in June 1969 with a Masters Degree in Management. She entered the Navy at Naval Hospital, St. Albans in 1951 and served at several naval hospitals in the United States as well as at Guantanamo Bay, Cuba. She is survived by her parents, two brothers and a sister.

LT James D. Matthias, MC, USNR, died on August 29, 1970 as a result of an automobile accident in Narragansett, R.I. He was born on January 5, 1942 at Waverly, Iowa. LT Matthias received his Medical Degree from the University of Iowa College of Medicine in 1968 and was serving on active duty as a flight surgeon with the Antarctic Support Activity, Davisville, R.I. He is survived by his father, the Reverend Paul C. Matthias of Clarksville, Iowa.

CORRESPONDENCE AND CONTRIBUTIONS from the field are welcomed and will be published as space permits, subject to editing and possible abridgment. All material should be submitted to the Editor, U.S. Navy Medicine, Code 38, Bureau of Medicine and Surgery, Washington, D.C. 20390.

NOTICES should be received not later than the third day of the month preceding the month of publication.

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SUGGESTIONS are invited concerning U.S. Navy Medicine, its content and form.

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Forces Ashore—2d Division Marines charge ashore at Onslow Beach to begin the amphibious assault portion of exercise Exotic Dancer III. (Photo by MSgt Gene Jones).

U.S. NAVY MEDICINE

☆ U. S. GOVERNMENT PRINTING OFFICE : 1970 434-357/2